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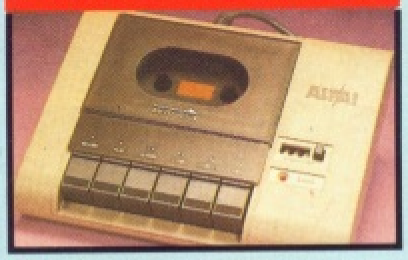
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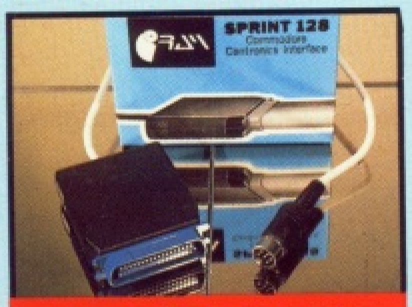
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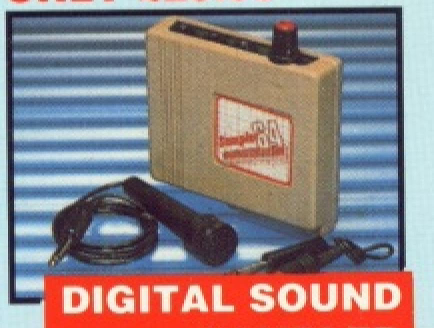


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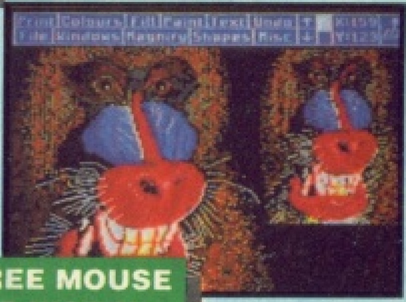
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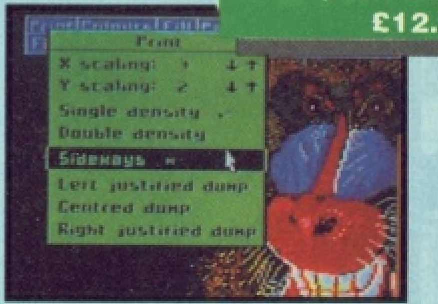


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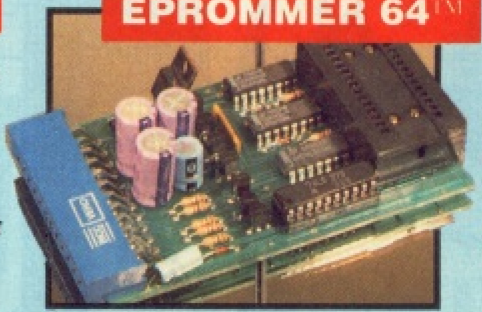
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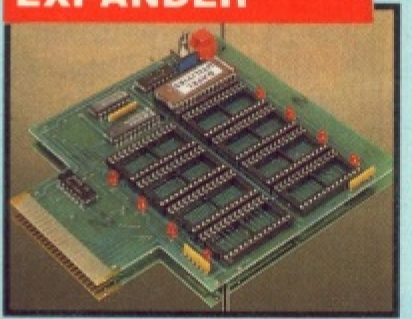
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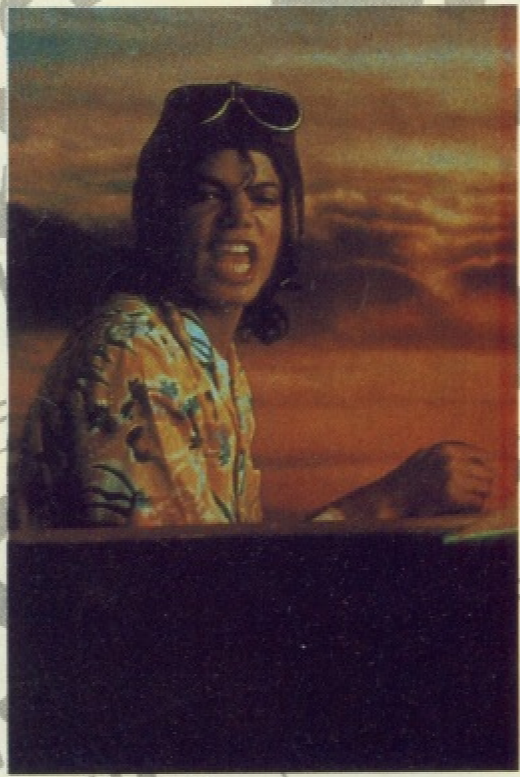
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Left: Comic Watch – page 30

Above: Cover feature – page 22



Above: Neon Zone – page 63



Left: Gazza Compo – page 56

THIS MONTH'S PROGRAMME

THIS MONTH'S PROGRAMME

22 Moonwalker
He's bad. He's mad. He's downright licence worthy Michael is half-plastic, half-computer game.

30 Comics
What do you get if yóu cross Batman and Superman? Bat soup, of course!

54 Rik of the Journos
The first of our YC Photostories. He was an innocent boy until he entered the edited highlights zone.

58 Printer Review
The Swift 24 - easier to plug into your computer than 24 swifts.

63 Arcades
They say coin-ops can make you go blind. John Cooke would disagree if he could see this statement.

REGULARS

6 News
And the main points again...

25 PC Corner
Our monthly police chat-line.

33 Your Programmer
The pull-out section with more listings than the Titanic (think about that one).

56 Big Wobbly Compo
Win a shirt and a ball signed by Richard Henderson...oops... Paul Gasgoigne, honest!

60 Software for Sale
Nope, it's not the naughty lingerie pages, but a service where you can purchase past and present listings on disk and tape.

68 Fourground
Plus/4 owners, we haven't forgotten you.

76 Mailbag
Full of lovely lettuce.

78 128 Corner
What do you call an object with 128 corners.

82 Back Page
Are there no bounds to Rik's scandalous scribblings. Evidently not!

GAMES

10 Curse of the Azure Bonds
Take heed all brokers out there. Do not touch the Azure bonds!

12 Gemini Wing
Soon to be followed by Capricorn leg.

13 Citadel
Stand a Rodney!

14 Sword of Aragon
The pencil is mightier than the sword. Unless, of course, you're in the middle of a medival barney.

16 Rick Dangerous
And Adrian Dangerous! We are the dangerous brothers...

17 New Zealand Story
Let's just hope that it's not going to be a new Australasian soap!

18 The Soccer Squad
But what's an octopus playing football for? Oh sorry, I thought you said "Squid"!

20 Xybots
That's what you get if you sit on a scrabble board.

21 APB
What are you going to do with that truncheon, officer?

YOUR PROGRAMMER

Pull out program section see page 33.

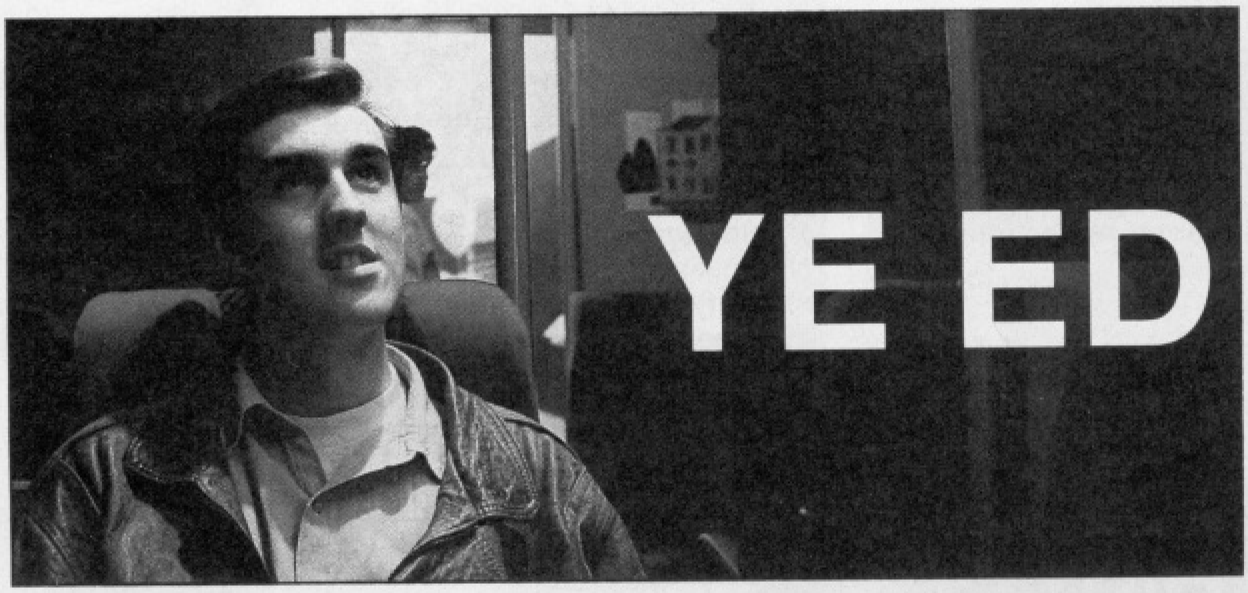
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YE ED SPEAKETH...

On Sunday 27th August 1989 I was invited to participate in the computer industry event of the year. Grandslam Entertainments had hired Luton Town's football ground for the day, and ran a charity soccer tournament in aid of the Hillsborough disaster fund and the baby care unit at Liverpool Maternity Hospital.

Needless to say that although the journalists came runners-up on the day, due to a rather exciting penalty shoot-out, both Paul Kavanagh and myself thoroughly enjoyed our day out and we look forward to competing next year. Apparently over £8,000 was raised on the day and congratulations must go to Stephen Hall of Grandslam and everybody else involved in the organisation for making it a successful venture.

This brings me nicely to the subject of football related games. Although we shall be exploring these in much greater detail in a later issue, I just find it quite startling that this year so many lincensed soccer games are being released.

There's the Liverpool, Arsenal and Saint and Greavsie games from Grandslam; Gazza's Super Soccer from Empire; Manchester United from Krisalis; and Super League Boss from Audiogenic (being programmed with advice from Lou Macari). As soon as Vinny Jones' boxing comes out my life will be complete.

Look after yourselves until next issue and don't let your shin-pads slip...

Rik Henderson

Game Show Goodies

The jingle of Christmas bells will come early this year as the tills at the Personal Computer Show ring in the new gear. Panic will no doubt be quickening the hearts of the programmers and managers throughout the country as the 27th of September deadline approaches.

Although there are always a few surprises which are kept under wraps until the last minute, a few morsels are thrown to the press to whet the appetite. So far Psygnosis is flexing its muscles to carry off the award as the most prolific software house of the decade. The company has lined up no less than 43 new releases for launch over the next seven months.

Fully animated aliens have been intercepted by the Pandora team and boxed into a 16 bit treat called *Project Xenomorph.* Also from the Interceptor Group, the low price label, Premier Budget, debut's its latest Joe Blade epic.

There's always an international flavour to the Show and high quality software is th elatest Spanish resort. Microdigital Soft is launching Dinamic's PC version of *Navy Moves* plus three new titles: *Grand Prix Master*, a

Star Performers

Star has extended its range of LC series printers with the addition of three A3 landscape format machines, one sporting a bottom feeder (Can we say that to our readers?).

The LC-15 is a wide carriage (16.5 inches) version of the fast, new LC-10 II. Both machines are developments of the phenomenally successful LC-10 but now with go-faster stripes added to their performance (67cps in NLQ). The LC-15 is the one which is also available as a bottom feed

new Freddy Hardest adventure called *South of Manhattan*, and *After the War* a post nuclear holocaust entertainment.

Andrew Hewson will be hoping for a better Show this year after being deserted by his star programmers on the eve of last year's exhibition. Amongst the games on preview this year is *Scavenger*, John Philips follow up to *Eliminator* and *Nebulus*.

CDS has stooped to appealing to the lowest common denominator with a range of games from US-based Artwork. Ironically dubbed as 'adult software', the first two games are *Strip Poker* and *Centrefold Squares*. Wrist aching action for those who get their jollies from digitised dollies.

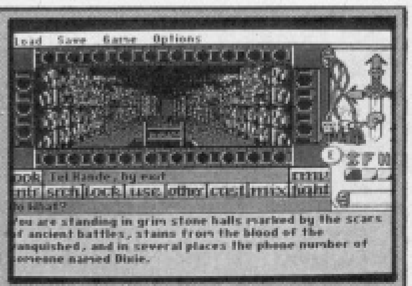
Mindscape's new games comprise *Startrek V, Harley Davidson, Fiendish Freddy* and *Life or Death*. The latter is a blood and guts operation which places the surgeon's electronic knife into the player's hands – should hit the right vein for high livers but it may cost you an arm and a leg.

Touchline: *The Personal Computer Show, Earl's Court, London: 27 September-1st October (Trade only: 28-29 September).*

Art of Tea-leafing

It's difficult to understand what someone is saying when their tongue is placed firmly in their cheek, however, we understand that Electronic Art's *Keef the Thief* promises to steal the Show this September.





Keef the Thief, meets Fred the Dead, Sue the Poo, and Paul the Fool.

Designed for Amiga and PC users who find *The Bard's Tale* too serious and esoteric, Keef has his feet planted firmly on the ground as he creeps around Tri-city looking for a few take-aways. Thieving comes easily to Keef as he searches for the six pieces of the magic statue which will make him the new God King of Tri-city.

First, Keef must find the scrolls which form a spell book. So, when there's magic about you know that Keef's got the scrolls – or maybe he always walks like that.

Bard's Tale fans can take Art with the latest EA fantasy roleplaying adventure, *Swords of Twilight* (Amiga only). Written by Freefalll Associates, authors of the excellent Archon, the idea is to beat the living twilights out of the guardians of the seven enchanted swords and thereby dispell the evil Shadowlords who have subjugated the neighbouring kingdoms. As in life, the characters have memories so be nice to the people on the way up – you're bound to meet them again on the way down.

Touchline: *Electronic Arts, Langley Business Centre, 11-49 Station Road, Langley, Slough, Berkshire SL3 8YN. Tel: 60755) 49442.*

Winter Draws On



Blue Ribbon hope to take the biscuit with a pools predictor program at the unbelievably low price of £2.99!

System 8 – The Pools Predictor is a dedicated database which the user gradually builds up as each result is announced. The program then takes the data and predicts the likely outcome of future matches in all four English and three Scottish leagues.

Hang on a minute, if hundreds of people buy the software and all enter the same data week after week, surely the prediction will be the same for everyone and won't that reduce the share of any winners? Personally, we'll stick to our lucky pins.

System 8 is available for C64, C16, Plus 4, Amstrad CPC, Atari BBC/Electron and MSX (who?).

version. Similarly the LC24-15 is a wider, faster version of the LC24-10.

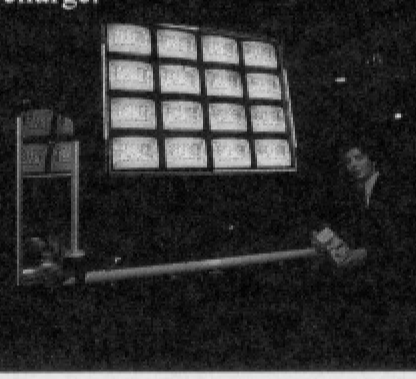
Although Star Micronics classes its LC series printers as low-cost business machines, the range is eminently suitable for home use. The prices start at £199 for the LC-10, £299 for the LC-10 II and LC24-10, £259 for the LC-10 colour version and rise to 9399 and £499 for the LC-15 and LC24-15 respectively.

Touchline: *Star Micronics UK, Craven House, 40 Uxbridge Road, Ealing, London W5 2BS. Tel: 01-840 1800.*

Video Rentals

You've read the magazine reviews, seen the advertising, now you can hire the video. In a rather interesting move Action Screenplay is supplying rental versions of its publicity video of the latest games releases to computer stores and video libraries.

Now hardened games addicts will be able to thrill to the latest game demos with the added benefit of a video magazine feature in the comfort of their living (?) rooms. The magazine features chart talk and issues of interest to mainline games fan all for a mere £1.50 rental charge.





Touchline: *Hot Shot Entertainments, 167 Berholt Road, Colchester Essex CO4 5AH. Tel: (0206) 751217.*

Yo Gazza what's the score



Paul Gascoigne, the crown prince of soccer, has signed up to a new team. But if you are the Spurs fan don't worry, he is not leaving Tottenham, instead Gazza has signed up for Empire Software and will star in Gazza's Super Soccer.

The game is due for release in October on Amiga and C64 and, if you believe the hype, carries more features than there are calories in a Mars bar. Top of the list is the "Boot-o-meter". This gives the player total control of the kick he is about to play, height strength or spin.

The pitch view will be different. With a number of varients depending on the position of the ball, though Empire say "it will work well".

What if *the* Spurs fan does not own a computer? Fortunately the game can be set for most of the 92 league sides and Scottish Premier Teams. Although I am sure it would be easier to play with Gazza, than against (unless your name is Gary Linaker).

If the game has any of the personality of the Mars Bar Kid it should do well and may even top the league, unlike Gazza's other team.

Star Wars Trio

Domark is to release its three games based on the Star Wars films. The Star Wars Trilogy packs in the coin-op classics *Star Wars, The Empire Strikes Back* and *Return of the Jedi* for the Amiga (£24.99), Commodore 64 cassette (£12.99) and C64 disk (£19.99).

New from Domark: the home computer version of Tengen's coin-op race game *Hard Drivin'*; from US company Broderbund comes *Shufflepack Cafe* and air hockey extravaganza against some hot alien competition and *Fanatavision*, an animation graphic designer which breaks Domark into the utility program field.

Hard Drivin' will be available on November 22 for the Amiga at £19.99, PC at £24.99 and for the C64 for £9.99 (cass) and £12.99 (disk). *Fantavision* is already in the shops but only for the Amiga and PC (£39.99).

Touchline: *Domark, Ferry House, 51-57 Lacy Road, London SW15 1PR. Tel: 01-780 2222.*

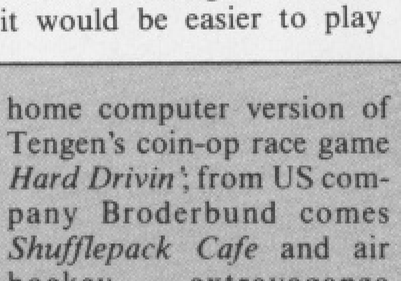
Dungeon's Drag On

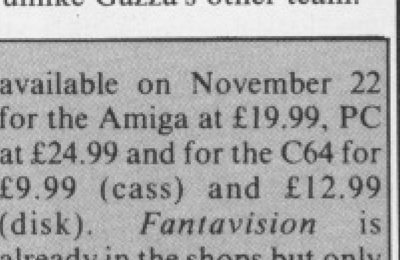
A year after the launch of the C64 and PC versions of the Advanced Dungeon and Dragon epic *Pools of Radiance,* US Gold's SSI division has promised that the game will appear for the Amiga before Christmas – do they mean Christmas 1989, they surely do? So what's the release date? Dunno!

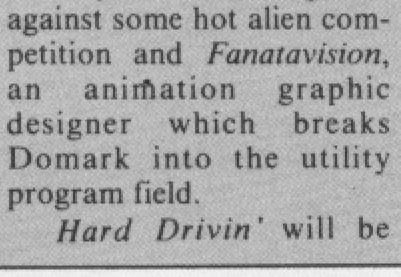
However, when the release date actually arrives, US Gold promises that the third scheduled AD&D game, *Hillsfar*, will be released one week later.

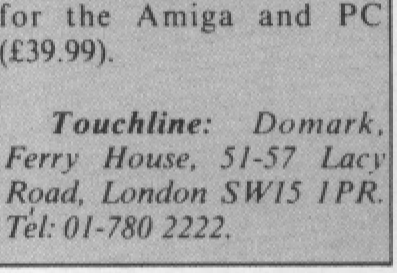
Ah! But what about the second game? On this the company is almost more specific. *Dragons of Flame* will be appearing in late October for the PC and Amiga (£24.99) and in late November for the C64 (£14.99 disk, £9.99 cassette).

We look forward to this with anticipation but we're not holding our breath. Until then *Heroes of the Lance* will suffice.









Go-ing for Gold

It's all systems Go for a trip to Taiwan for Switzerland's Anders Kierulf, the winner of the first Acer Computer Olympiad which was held on 15 August at London's Park Lane Hotel. All Kierulf had to do to win was to program the most challenging version of the popular oriental game of Go.

Each year Acer sponsors the world's computer Go championships in Taipei, Taiwan and the Olympiad was devised partly as a qualifier for this event. Conceived and organised by David Levy, an International Chess Master, the Olympiad also invites entries for other events such as Chess, Scrabble and 10x10 draughts and this debut attracted 85 programs from 17 countries.

In the Olympiad, programs compete against each other in a death or glory battle to the death and the medals are awarded to the winners in each category. In the 19x199 Go event the competition was expected to be stiff because the prize means a trip to compete in the world final, the winner of which can then try his program against the skills of a human expert. If the game wins, the programmer stands to claim a £1 million prize so Kierulf stands to gain a lot with his *Swiss Explorer* program.

Any companies or budding whizz-kids who think they can beat the world's experts can get further details from David Levy at the address below. The 1990 Acer Computer Olympiad will be held at the same London venue from between 8 August and 14 August 1990.

Touchline: *David Levy, 11 London Road, London NW8 0LP. Tel: 01-624 5551.*

CURSE OF THE AZURE BONDS

Curse of the Azure Bonds continues the series of games based on the Advanced Dungeons and Dragons role playing system and starts with parties of 5th level and over.



SSI – PC £29.99, C64 Disk £24.99

CURSE of the Azure Bonds continues the AD&D tale that ended with a great victory over the dark forces in the city of Phlan. Now with a party of 5th and 6th level characters you thought you were ready for anything. Unfortunately you were wrong, as you now find you party coming round in the city of Tilverton and all is far from well. All magic and equipment is gone and now you have five blue symbols just under the skin of your sword arm. These you will soon learn are the handy work of the five evil leaders of the New Alliance. Each one bonds you to do their will upon call and your only way out of this curse is to destroy the New Alliance.

Your party of brave adventurers can include up to six 5th level characters and can be loaded in from a Pool of Radiance of Hillsfar save disk, although you may want to roll some new ones as existing characters could have race level restriction: Or you may want to try out a Paladin or Ranger as these can now enter the fray. Luckily your hijackers have left the party with some money to purchase new equipment but upon attacking the king's carriage you find yourself thrown in jail only to escape in the sewers that have become the base for the Fire Knives (a group of thieves). Here you will encounter your first challenge as one of your bonds matches their flaming blade symbol.

The game system will be familiar to those who have played Pool of Radiance (this game's prequel) and has the same 3D views, top down combat screens, slow but tactically accurate combat system and duckshoot menus to control your characters. However there have been some additions to speed up gameplay. The first is the FIX option included in the camp menu that is used to take the pain out of memorising and casting "cure light wound" spells. Select FIX and it's done automatically although it does take up game time. In Pool you could spend ages wandering around the wilderness, but now a full manual to try and find the best way to deal with creatures such as elemantals, salamanders and beholders, as these are your new foes. You may find enemy clerics and magic users to be a problem but wait until you come across a mean little beasty known as Dracolith which is an undead dragon that can attack with both a breath weapon – such as fire, cold or acid – and a paralysing touch; it's just as well you can save the game everytime you enter camp. Consequently, the game lacks the constant battles with 30 orcs that plagued Pool of Radiance and you face fewer more powerful creatures which makes for a more interesting game. The possible exceptions to this are the patrols of organised creatures, such as Dark Elves or Fire Knife thieves, but these follow set patterns and can be avoided.

As before, the on screen action is backed by references to entries in the accompanying adventurer's journal that also includes tales and rumours that you can discover by drinking in the screen map directs you to destinations via either trail, wilderness or even boat. Both of these speed up the game considerably and leave you to concentrate on the curse.

Your problems are complicated by the various factions of evil that are fighting for this corner of the Forgotten Realm, so it's safe to





Above: Don't you think graphics like these just drag on!



assume that almost everywhere is hostile and if you meet one of your "masters" things can get tricky.

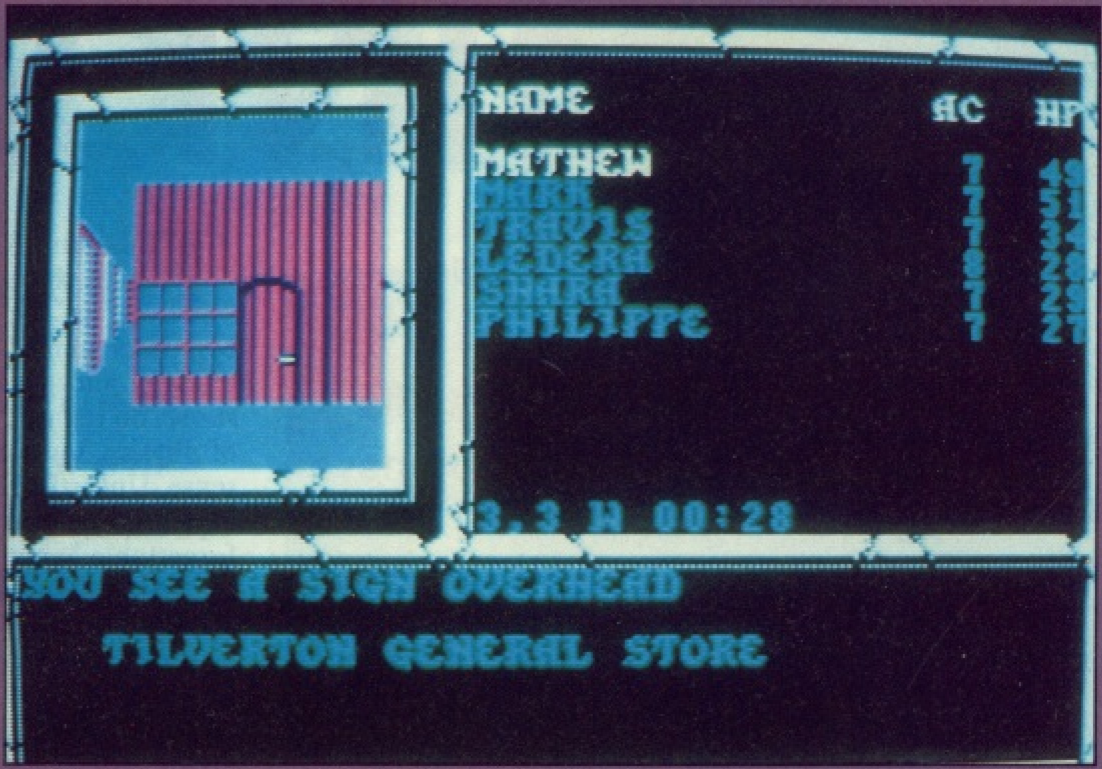
Curse of the Azure Bonds also has a very different style of gameplay, as due to your attack on the king you don't have a fixed base to work on, so there's no systematic clearing of areas. Instead you must follow the trail of clues and rumours to confront each of your masters and their minions in turn.

It may take time to adjust to combat with 5th, 6th, 7th and 8th levels characters as you have so many other options to think about – such as which spells to use and how and when to attack. You'll also find it useful if you had an AD&D monster local taverns.

There are few differences between the two versions of the game except that PC hard disk owners can do away with all the disk swapping associated with a game with 8 disk sides.

Curse of the Azure Bonds is the fourth game based on Advanced Dungeons and Dragons that began with Pool of Radiance. The good news is that there are more to come.
Tony Hetherington

The AD&D games are the result of a three cornered deal between D&D authors TSR, US software house SSI and US Gold. There are still four years of the first agreement left to run.



Above: Serves you right! You should never have visited Honest Ron's Tatoo Emporium and asked for 'Millwall are great'.



Above: If you ever want a high ranking army officer, Tilverton's the place to be!

Below: Dance of the amazing lego sprites.



INFO (64)

Gameplay: 94%
Graphics: 71%
Sonics: 30%
Lastibility: 95%
Overall:
78%

INFO (PC)

Gameplay: 95%
Graphics: 65%
Sonics: 30%
Lastibility: 95%
Overall:
71%

GEMINI WING

Virgin – £9.99 Tape, £14.99 Disk

The ultimate in gutter press has started an intergalactic war with its jingoistic outpourings. Now you have to save the day.

This game features perhaps the worst scenerio in the history of computer games. It is both unlikely and unrealistic and shows no regard for the laws of physics, logic or common sense. Unfortunately, it's the best part of an otherwise forgettable game.

The scenario centres around an Earth newspaper known as the SoonDay Spirit (I wonder what that could be?) and its silly stories about aliens turning girlfriends into potatoes and so on. According to Virgin these headlines had upset the aliens in question and when the Soonday Spirit went too far with the heading "Die Mutant Alien Scum" the entire forces of every planet in the galaxy arrived to destroy the Earth. But wait! Is it a bird, is it a plane? No, it's you. Armed with only a single laser Gemini fighter you take off to destroy everything else in the galaxy to save the day and rack up a high score. Oh yeah? You have a smuch chance of knitting fog or leading England to victory in a Test series.

This takes you to the game itself which would be reasonable as a £1.99 budget release but not as a full priced game. It's yet another shoot the aliens to collect extra weapons style of game. This apparently was caused by a "strange paradox in the fabric of reality" which probably also explains how Virgin can follow up a classic like Silkworm with a game like this.

Tony Hetherington

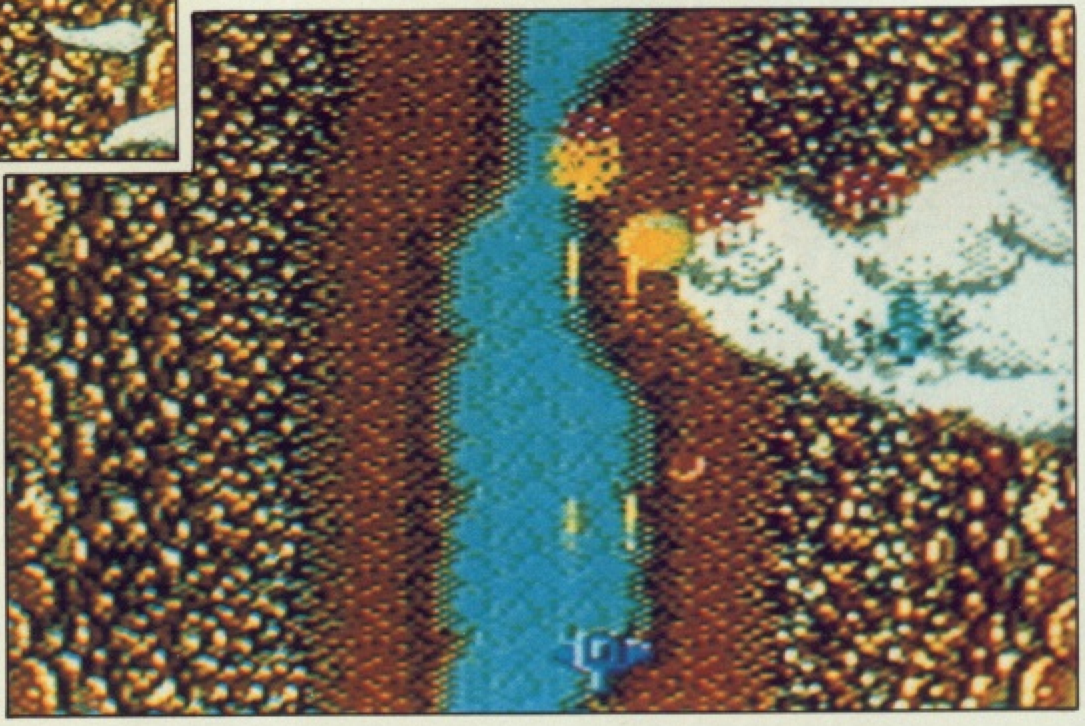
INFO

Gameplay: 22%
Graphics: 25%
Sonics: 28%
Lastability: 10%
Overall:
21%

*Back in the dawn of computer time **Virgin** created a game as bad as Gemini Wing called Owzhat. It was based on cricket. Unfortunately to change the name of a player, you had to break into the programme and change the code!*

Below: When you've killed the blob-like aliens...



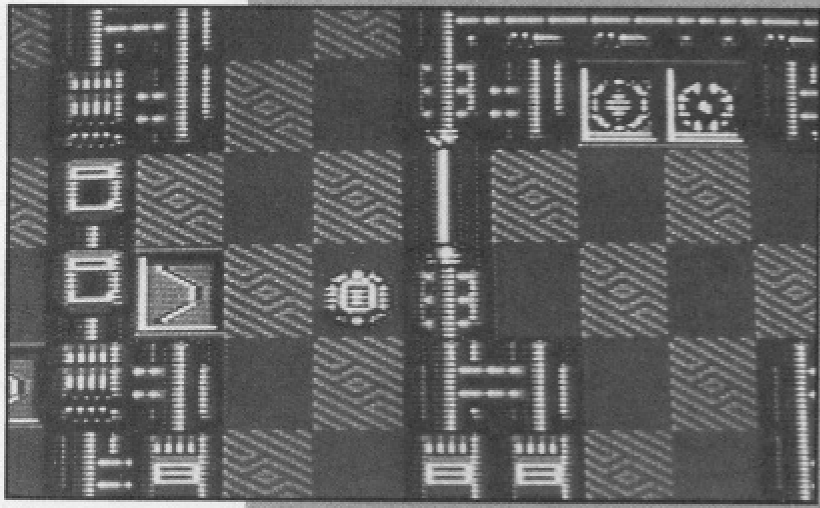


Right... it's time to kill many more blob-like aliens!

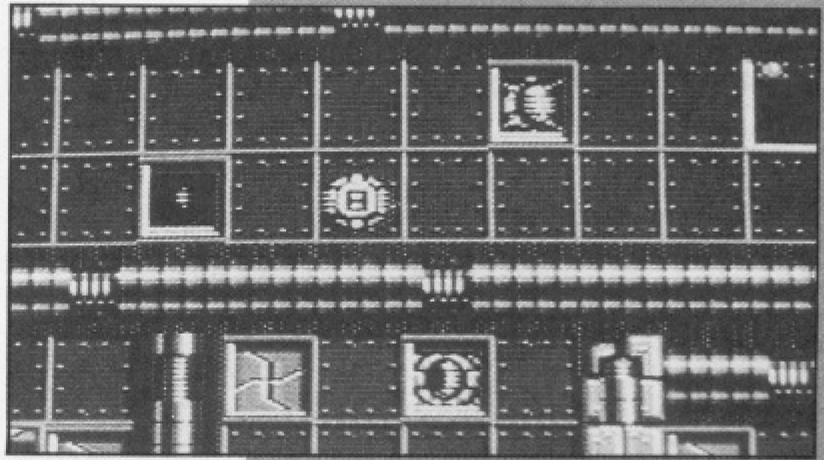
CITADEL

Activision - £9.99 Tape, £14.95 Disc

All was quiet, all was still. Darkness prevailed and neither good nor evil was present; until the monitor probes moved in to investigate an unknown power source.



Above: I wandered lonely as a small metallic droid.



Above: And now on Celebrity Squares is Mr. Small Metallic Droid...

For a time, nothing happened in the dark dank recesses of an underground complex on a distant planet. There was no light and no sound, and nothing moved.

Nor had anything thought of moving for quite some time, but they were still charged up and, high above the planets surface, a probe was watching, listening, monitoring and unidentified power source.

But the planet lay dormant. Nothing moved upon it's surface, no birds flew and no fish swam in the seas, and yet, an electrical force was being detected.

Relaying the data back to base, the probe was replaced by a transporter ship which landed five droids upon the surface. They set about finding the power and eventually traced it to a subterranean city.

Going underground, the proble begins transmitting pictures of it's surroundings and switches tomanual control for you to maneuver it around the mazes of corridors which have revealed themselves.

Caution is the only approach in an unknown surrounding and if you do not observe this, you will loose probes like ice cubes on a hot day. As you near certain areas of floor, they open and gun turrets appear and open fire. Others open and eject mobile death machines which roam around the maze and latch onto your trail. Following you they will launch projectiles at your probe and can seriously damage it's circuits.

However, the design of these mobile robots has one major flaw in it; they are easily re-programmed using a standard code. Utilising this flaw, your probe can issue instructions to the robots which causes a change of heart and they rebel against their creator and protect you. Once reprogramming is complete, they will still follow but they will get in your way and act as a shield. However, squabbles still break out if you decide to have more than one born-again robot following in your footsteps. Newcomers will run into the back of those already established and cause them to explode.

There are various levels to navigate and each one contains a different breed of robots. Some seem to be armour plated and require more hits to destroy, others seem to be able to shrug off the new programming and turn against you once more. And the dangerous bit is that you can't tell when they have lost their friendship.

Your energy level depletes as you come into contact with the enemy of their fire, but there are bunkers which contain energy and fuel littered around the mazes. Also on your travles you will find weapon pods which modify your defences. Lift shafts take you from level to level and transporters zap you from city to city.

Ultra-smooth scrolling, great sound effects and decent graphics make Citadel one of the most playable games in quite some time. It's damned addictive and the best part is that it's not just a shoot-em-up and requires a few ounces of sense and some strategic thinking to get you through. To Activision all I have to say is "please produce some more decent games like this".

Andrew Banner

Citadel is from ***Electric Dreams*** *who produced such marvels as Super Sprint and The Incredible Shrinking Sphere. Marketed by Activitison who have a recent track record of poor quality games, Citadel comes as a pleasant change.*

INFO

64

Gameplay: 82%
Graphics: 76%
Sonics: 83%
Lastability: 84%
Overall:
84%

SWORD OF ARAGON

SSI (US Gold) – £29.99

Roleplaying, politics and war are all part of this fantasy epic.

The Duke of Aladda has died leaving you, his son, to your destiny. A destiny that demands for you to lead your people against the orc and goblin hordes and into battle with your enemies to the East. Only when you are liberator and leader of all Aragon will you fulfill your father's will.

Your first decision may be your most difficult as you must choose a character class to be throughout the game. You can be a great Warrior, Knight, Ranger, Priest or Mage – the last three making up their lack of fighting strength with magic.

Your choice of class also effects the type of armies you will raise as, for example, a Warrier can build infantry for half the cost of others.

Money plays an important part of the game as you must manage your city's affairs by setting tax rates and choosing between raising an army or developing trade and industry. Both have their priorities since you need an army to defend your city and expand, but you need resources to develop, train and pay for it. You also have to remember that the townsfolk may not like paying taxes at 80% and may strike, leave or rebel, scuppering your chances of success.

As Duke you must prove yourself as a leader and a statesman by dealing with envoys from other towns and resolving local disputes that can have an effect on your people's health, morale and loyalty. These in turn effect your revenue and the upkeep or expansion of your army.

Each turn represents a month of time in which you must manage your resources, defend your territory and expand to liberate the land. Which will inevitably lead to battles. When a battle erupts you must organise your forces for the fray. Obviously, your tactics will vary depending on the opposition you face and the units you have at your disposal. Personally, I favour bowmen that can weaken an opponent before it reaches you. Where they can be crushed by cavalry charges or by infantry armed with swords, javelins or spears.

Priests, Mages and Rangers should be kept safe behind the line where they can use their magic to greater effect. (Although you represent one class you can hire members of the others to supplement your armies). Unlike other SSI games where magic users cast lightning bolts and hurl fireballs the magic in this game is more subtle. These spells effect the movement and fighting ability of friend and foe by changing the terrain or slowing an advance. Stamina can be restored or drained and armies can be healed, confused, terrified or teleported.

As the battle continues in turns (up to a maximum of 23) victory points are awarded for losses inflicted and territory gained, which finally decide the outcome of the battle. A loss will cause a drop in morale and loyalty but a great win will bring plundered gold, new recruits for your army and experience for your troops. After a few battle these points will amass to form increases in levels which will bring more spells to your magic users and better fighting skills to your units. For example, level 4 mounted bowmen cause more damage with every attack than level 1, 2 or 3.

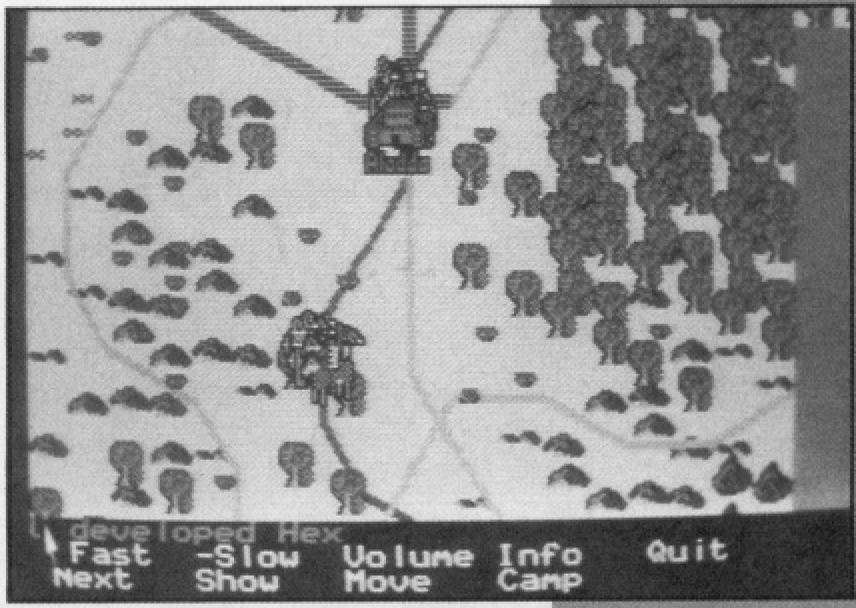
The result is a fascinating game in which you gradually explore the resources and forces that you have and learn how to use them to expand your empire. The incredibily high Lastibility factor is well earned as it's the style of game that you actually enjoy the more your play. Starting with a lost period when you're not quite sure what you're doing you gain military and character experience which sends you back for more and more. I'm afraid I'm not going to get much sleep until Aragon is free and I've earned the 600 points needed to complete the game.

Tony Hetherington

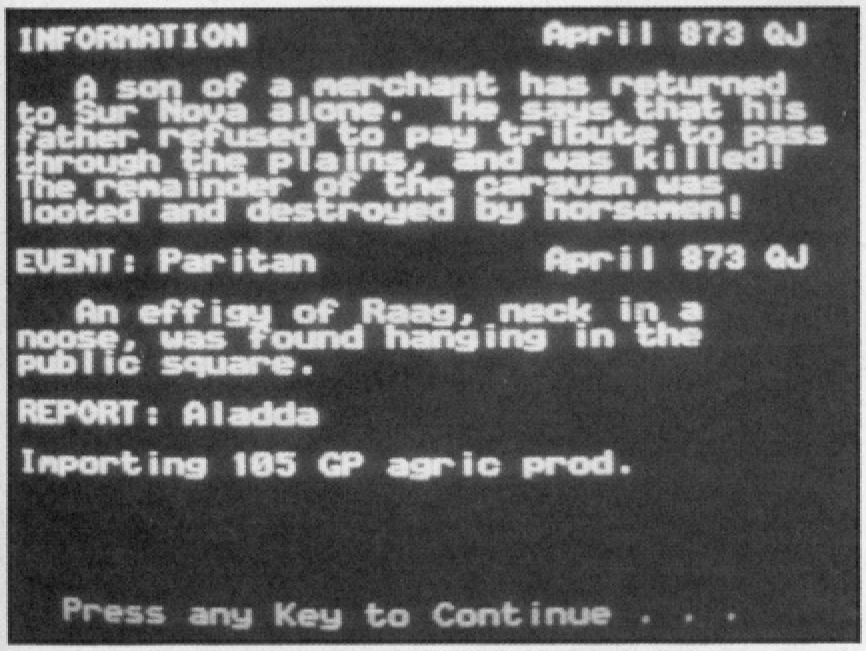
SSI is the company that took the headlines with the Dungeons and Dragons licences. Games like this show why it got the contract.

INFO

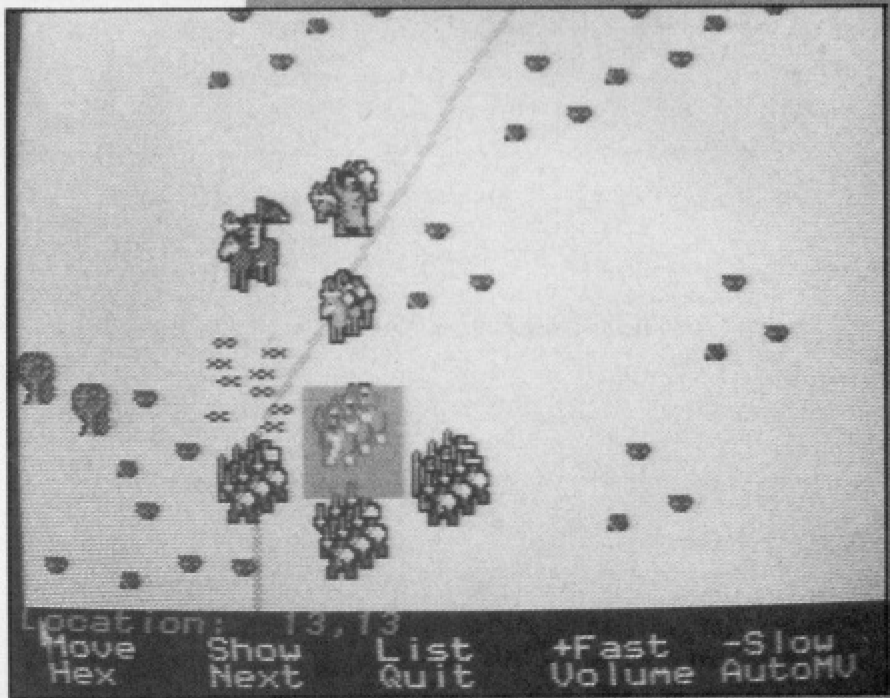
Gameplay: 85%
Graphics: 56%
Sonics: N/A
Lastability: 95%
Overall:
91%



Above: I bet Danny La Rue would choose the camp option.

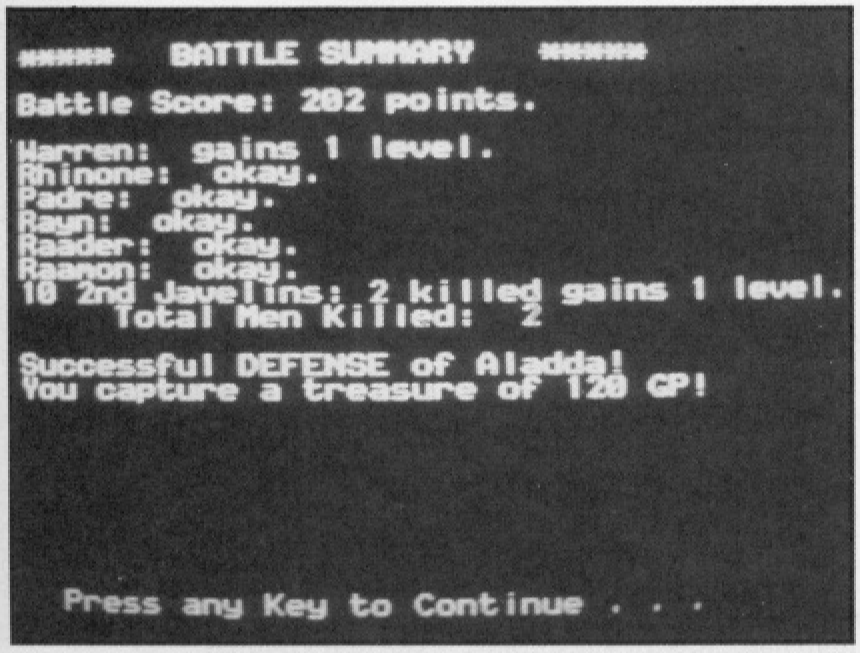


Above: There's nothing quite as satisfying as a page full of text.

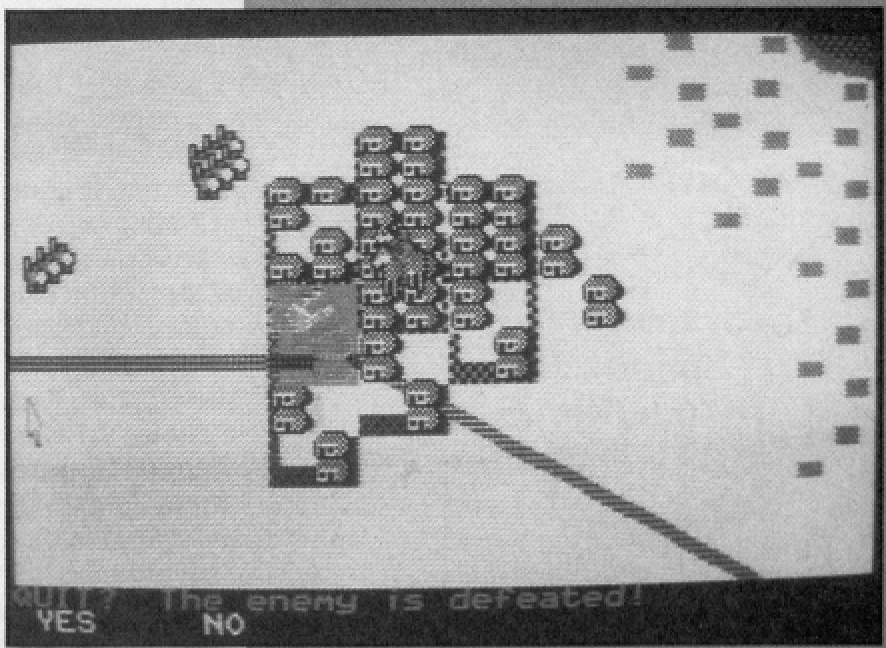


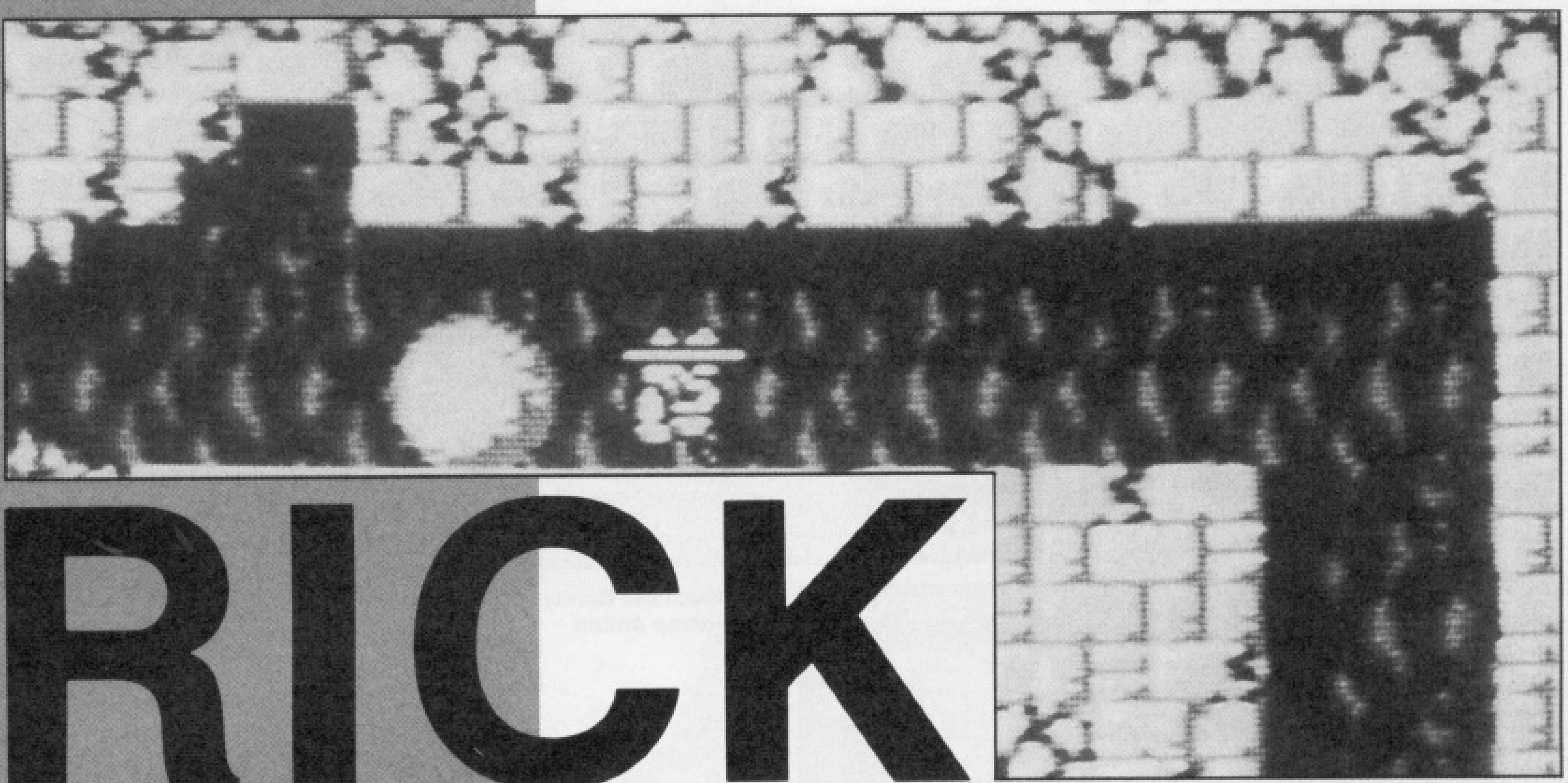
Above: I've got a great idea guys. Let's all head for that big square!

Below: More text? I like it Mikey!



Below: The sequel's called 'The Flick-Knife of John'.





Above: Now where's that Terrys Orange?

RICK DANGEROUS

Explore the temples and avoid the traps, but will there be a chocolate orange for you at the end?

Firebird – £9.99 Tape, £14.99 Disk



Above: But Rick, that's dangerous!

INFO

Gameplay: 65%
Graphics: 60%
Sonics: 50%
Lastability: 45%
Overall:
55%

They say that there is no such thing as a new joke: everything is a derivative of something else. To some extent, the same applies to computer games. Firebird's latest game, Rick Dangerous shows distinct signs of a common ancestry with assorted platform games of many years ago.

Our eponymous hero, part time explorer, part time stamp collector and whole time good guy has been on the trail of a long lost South American tribe for many a long year. By a strange coincidence, when his plane runs out of fuel over the jungle, he just happens to land at the entrance to the very Aztec temple he was searching for.

Getting in proved to e easy. Getting out at the other end was decidedly more problematical. No sooner had the door slammed behind him than a huge stone ball starts to chase him down the passage. With no time to change your name from Rick Dangerous to Rick Moss (because as we all know, a rolling stone gathers no Moss!) (Ha ha, very droll. Get on with it – Dangerous Rik!) your only option is to throw yourself off the cliff at the end of the tunnel. Surprise surprise, gravity works in South America too and the ball follows you...

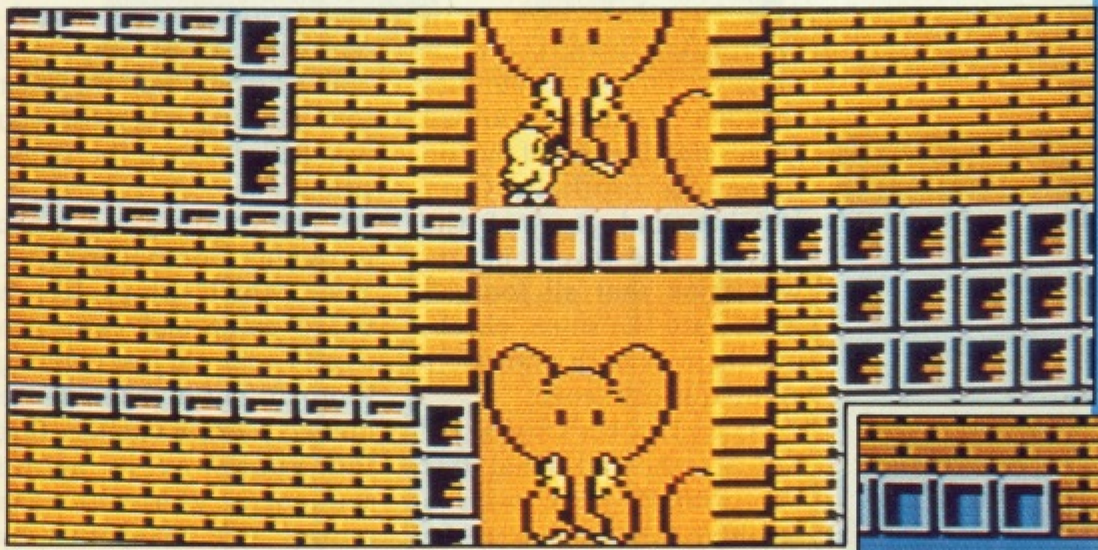
Having eventually dodged out of the way of the overgrown concrete marble, all you have to do now is similarly avoid a series of angry natives, a few snakes and bats, lots of poisonous spiked pits and a whole load of spears shooting out the walls, before you finally reach the other end. Then you can try your hand at three other scenarios including a mighty fortress and an Egyptian tomb.

In order to defend yourself, you can poke things with your stick. Timing is all important here and I found the technique useful only against bats. Natives are best dispatched with a swift bullet but you only carry a few of these and the noise they make is all too likely to set off a trap. You will also need dynamite to blast your way past rock falls and the like.

The trouble with this game is the lack of variety. Problems are usually only solved by trial and error – you frequently have to throw yourself into the unknown. Once you have solved that part of the game though, it is unlikely to cause you further stress and soon becomes repetitive. Fun and simple to play, I would suggest that it is overpriced somewhat. It would make a very good budget game.

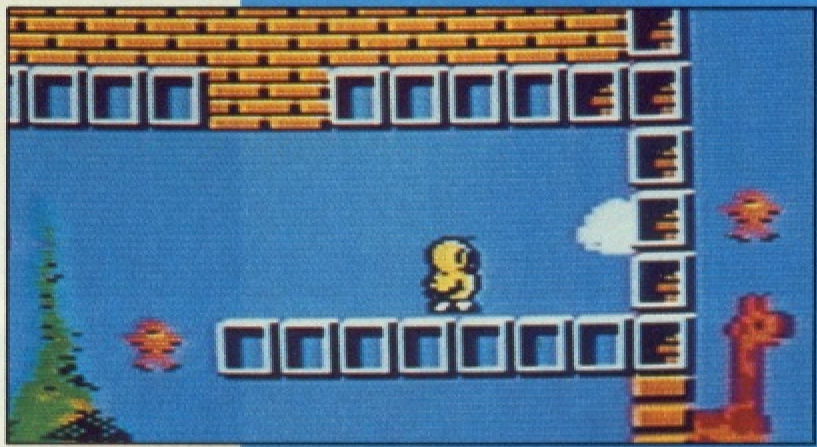
Gordon Hamlett

NEW ZEALAND STORY



Below: Hmmm! Fried Kiwi, my favourite.





Above: If you need a new beak, buy one from us. Two months later we'll send you the bill!

Your chance to become a fully paid up member of the Antipodean rescue service.

Ocean – £9.99 Tape

On the face of it, kiwis are something of a failure. New Zealand's most famous bird, they are totaly incapable of flight, not very good at swimming and pretty ugly to boot. They do have one redeeming quality though, they are extremely loyal. So when 20 of Tiki Kiwi's friends are captured by a psychotic walrus, he doesn't hesitate. Armed only with his bow and arrow, he sets off to rescue his friends before they experience a walrus's digestive system from the inside.

The game is a variation on the old ladder and platform theme, but is none the worse for that, having been skillfully converted from the arcade original.

You must reach all of your friends within a certain time allowance. A rader shows your relative locations and, on the early screens, there are a few helpful arrows to point you in the right direction. Although you only have your bow and arrow to defend yourself with, shooting some of the enemy will force them to drop other, more potent weapons – bombs, bouncing missiles and potions of temporary invulnerability being examples. Collecting fruit scores bonus points and if you manage to pick up all the letters of the word 'extend', you are granted an extra life.

Malicious bunnies, boomerang throwers, evil frogs and vampire bats will all impede your progress and there are also some very large guardian creatures that have to be defeated, not always by orthodox means – the only way to escape from the whale is to allow yourself to be swallowed first. You are then caught up literally in a shoot out!

As well as travelling on land, you will also need to take to the air. As already mentioned though, your wings are not equipped for this purpose so you will need to hijack a balloon to help you. You will also need to watch your oxygen levels when swimming underwater. Drowning is not good for your health!

New Zealand Story is very well presented and is one of those rare games that although simple to play and easy to get into, is highly addictive. Above all, it is good fun which, when it comes down to it, is what a good game is all about.

Gordon Hamlett

INFO

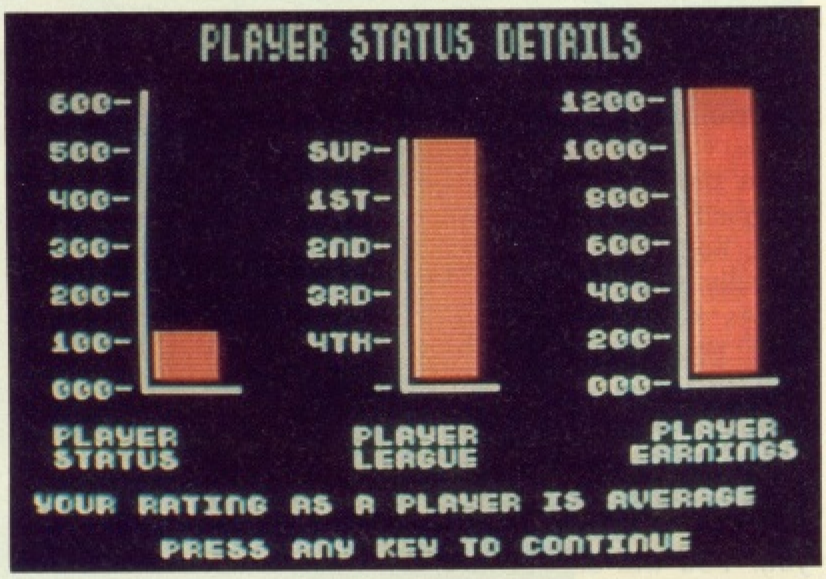
64

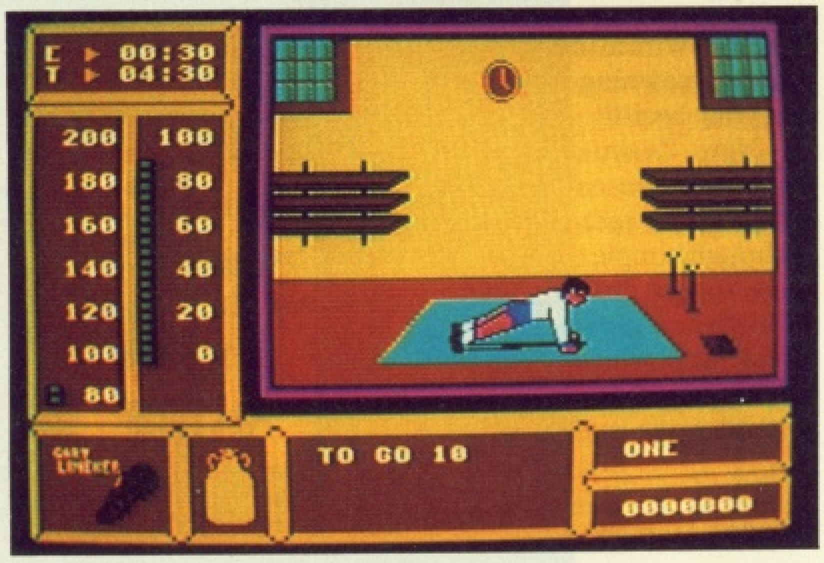
Gameplay: 95%
Graphics: 75%
Sonics: 65%
Lastability: 85%
Overall:
80%

The Soccer Squad

Now that the new football season is well under way, the software charts are dominated by football games. Gremlin has fielded a team of four experienced players as its challenge for the top.







Gremlin Graphics – £9.99 Tape

Four games for the price of one is always worth a look as it often offers great value for money. This one bundles together Gremlins football games starring two of the top names in football, Gary Lineker and Roy of the Rovers. However, before you think that all football games are the same, check-out these as each one offers an unique challenge.

Gary Lineker's Superstar Soccer is the traditional style of football game with a scrolling side on view of the pitch and joystick controlled players. In the game you can take control of the centre forward, goalkeeper and manager – as which you can pick your team from a squad of players and decide team tactics by telling forwards to shoot or pass, and defence to either stay back or support the forwards. Perhaps, the best part of the game is that the forwards don't just shoot at goal willy nilly they can also attempt spectacular goal attempts with headers and overhead kicks if the ball's at the right height.

Gary Lineker's Superskills is a selection of training exercises, that inclues gym training (such as pushups and squat thrusts), field work (including dribbling, chipping and shooting) and ball control – where you must keep the ball off the ground by bouncing it off various parts of your anatomy.

Roy of the Rovers is a curious mix of football action and arcade adventure, as some unscrupulous gang has kidnapped the Melchester Rovers team just before a big exhibition game that could save the club from the developer's bulldozers. In a race against time you must avoid enemy supporters, hoodlums, traps and ambushes and find the other four players, otherwise you will have to face the opposition alone.

The fourth game is the intriguing Footballer of the Year which plays like a board game and casts you as a 17 year old just entering football. Through taking the limited scoring chances that fall your way in action sequences you will earn money and be spotted by scouts from other teams, gradually taking you from fourth division obscurity to first division and international football, and perhaps the ultimate accolade as the Footballer of the Year.

Although together they represent a good footballing package they are, at best, 2nd division games as they lack the quality and depth of the top of the genre.

Tony Hetherington

Gremlin Graphics has now moved out of the US Gold stable and back to Sheffield and independence.

INFO

Gameplay: 50%
Graphics: 38%
Sonics: 35%
Lastability: 42%
Overall:
41%

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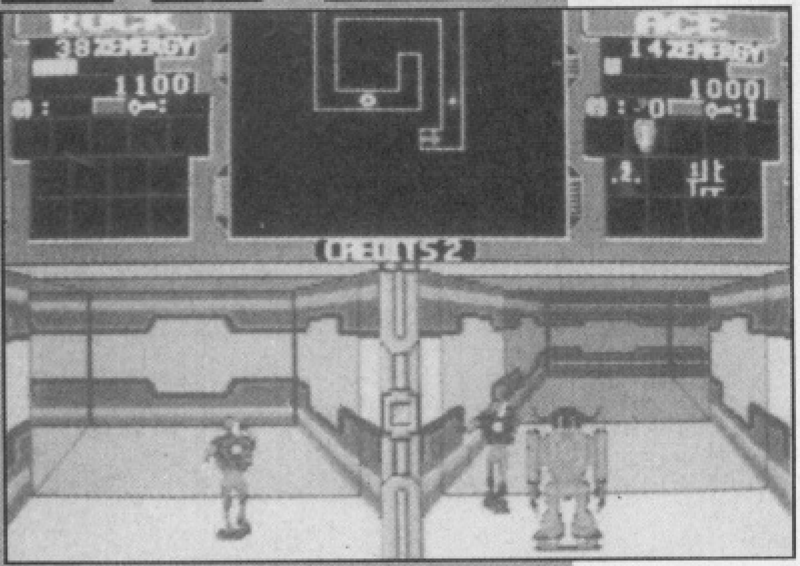
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XYBOTS



Above: Aaargh! There's a robot coming at my XY Bottom

Domark – £9.99/£12.99

A mechanical menace in the form of the Xybots is assaulting the Earth. All that stands between them and victory are two waddling heroes.

Enter the heroes, two butch commando type characters who waddle forth to victory as though suffering from the after effects of a grade A vindaloo.

Despite the ridiculous waddle our heroes are mean, if a little limited. As they move through the maze complex of the Xybots their progress is shown on a small, colourless section of the screen. This fault typifies two player games of this nature. Although it enhances a game no end to let two players to play simultaneously, the loss of playing area often spoils the gameplay. And when nearly half the screen is taken up with stats and a map, things become a little ridiculous. The only advantage in this game when playing with two players is the ability to shoot each other in the back and the combined firepower.

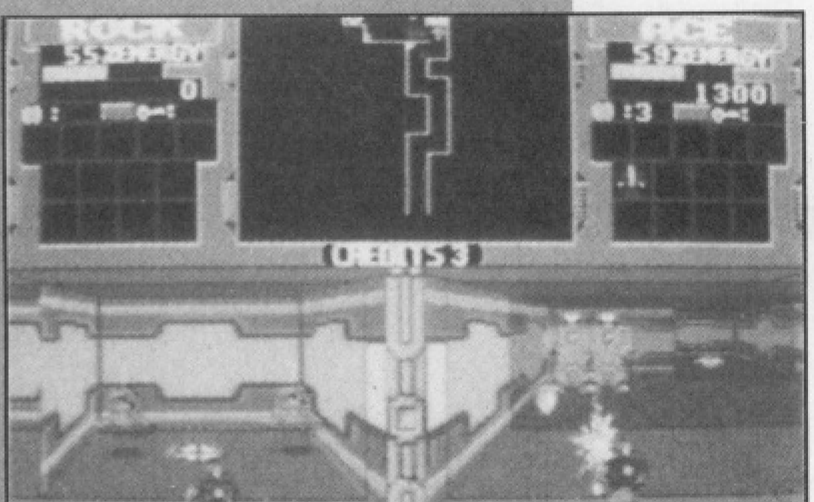
The Xybots are a mechanical race and not confined to the usual limitation of the humble organic body. This means they can move a lot faster, carry more armour and pack twice as much punch into their shots. Despite this advantage and your rapidly dwindling ˝power supply you still manage to slaughter the suckers. This could possibly be due to the artifacts picked up here and there on your travels. Coins can be collected for later purchase of mappers and extra firepower. Energy capsules to keep the body functioning and a host of gadgets to boost your characters abilities.

On level one a little ingenuity is rewarded with the discovery of a teleport pad that takes you directly to level eight. Not only does this allow you to skip the interceding levels but a cache of coins ensures that your character can purchase enough hardware to handle the challenge. If you decide to take the longer route you will be rewarded by a display of hostile mechanics never before seen on your 64. Small robots flit through the maze moving collectible items, large cannon toting robots guard the passage ways and the infuriating droids with the flaps, a killing blow can only be landed on these when their doors are open. The lack of colour makes the returning fire a little awkward to spot so just count the number of blasts currently in circulation and if the number is greater than your feeble firing capacity remember to dodge.

Remember not to panic when a little sign pops up and points to some danger off to one of your sides, as to turn you need to press the fire button and move the stick; the other way around and you blast the wall.

This is not so much a bad conversion but a bad game which, without the advantages heaped upon it by a dedicated arcade machine, fails to produce goods.

Adrian Pumphrey



INFO

Gameplay: 47%
Graphics: 60%
Sonics: 78%
Lastibility: 73%
Overall:
60%

Xybots is one in a range of Tengen conversions by ***Domark****, who currently holds the licence to convert all Tengen releases to home micro format for the next three years..*



APB

Domark – £9.99 Tape £12.99 Disk

The third game from Atari subsidiary Tengen puts you behind the wheel of a police car.

APB, or All Points Bulletin, casts you as rookie officer Bob who must patrol busy streets searching for criminals to apprehend. However, these crooks are far from dangerous, consisting mostly of litter bugs, drunks and hitch-hikers. You must arrest enough of these to meet your daily quota.

Your job is made easier by the fact that these crooks drive around in colour coded cars so it's simple enough to drive up behind them, sound your siren to pull them over and bag yourself a bonus. To help you, you can also pull into a gas station for more petrol, grab a doughnut to give you more time and visit a speed shop to soup up your patrol car by adding armour, extra speed, acceleration, and even a gun to shoot more serious crooks.

By day three of your eight day career you will be called to track down a more serious criminal going under a subtle pseudonym, such as Freddy Freak and Sid Sniper. He isn't as easy to track down as the litterbugs and has to be rammed off the road before coming quietly. Once caught he must be interrogated by waggling the joystick left and right in order to get him to sign a confession before your chief arrives.

APB promises cartoon style humour and graphics, but delivers a Spy hunter style driving screen and tiny briefing and report screens that barely fill a fraction of the screen. This is the third Tengen game where collecting credits, in this case money bags, can be cashed in at a shop for improvements to your tank, robot or police car. Let's hope that future releases aren't just the same game system in a different setting.

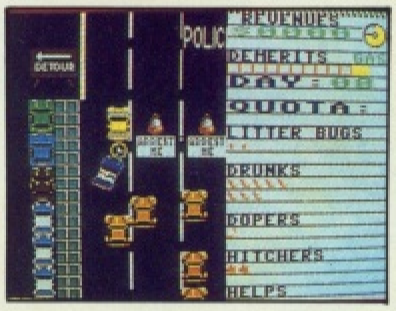
All things considered it just doesn't add up.

Tony Hetherington

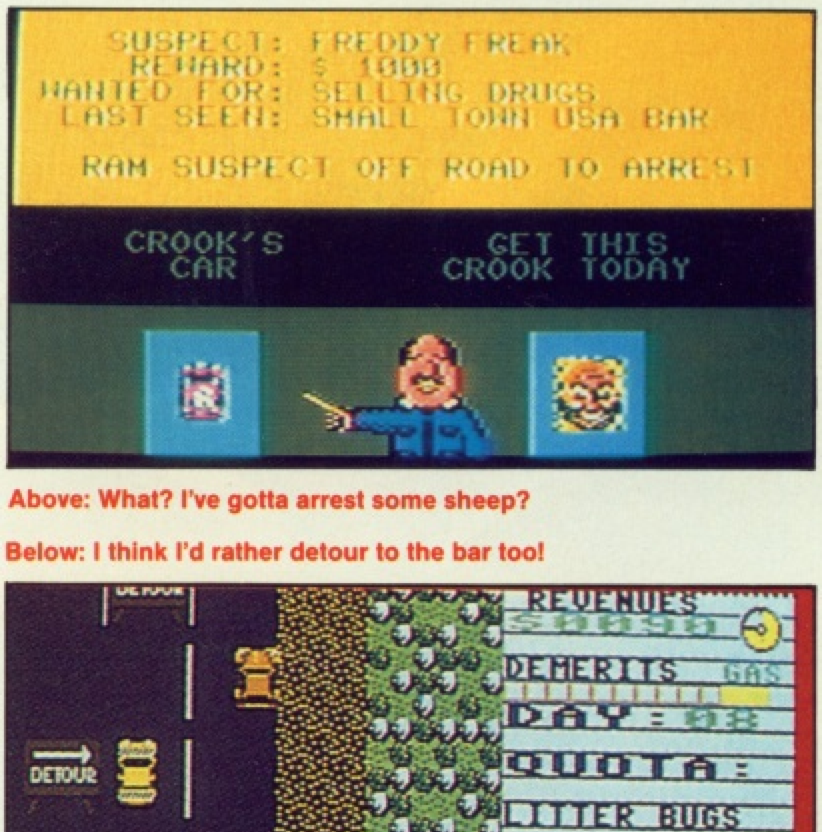
INFO

C64

Gameplay: 32%
Graphics: 43%
Sonics: 35%
Lastability: 28%
Overall:
35%



APB – Another Police Bash



Above: What? I've gotta arrest some sheep?

Below: I think I'd rather detour to the bar too!



SMOOTH CRIMINAL

Michael Jackson, pop phenomenon or over-publicised eccentric? Rik Henderson explores the man, his music, his movie and previews the forthcoming game from US Gold.

If we were to believe everyhting that we read in our national dailies, not only would we have brains the size of amoebas, but we would be led to think that Michael Jackson has committed every strange act known to man, short of living on the moon.

Luckily most people have the sense to shun such comments and try to understand the man as a human being. He was born in 1960 in Gary, Indiana, where he, and four of his brothers, formed a band which was to take the world by storm.

The Jackson 5 were first brought to attention in 1968 when they auditioned for Motown Records. And it was their appearance on the Ed Sullivan Show in 1969 that brought them firmly into the public eye. Michael was the lead



singer, and was but 9 years of age when they experienced their first number one hit.

When Michael was 12 he recorded 'Ben', which was the first solo hit of many, and it was in 1978 that he split from his family group to explore the world of music, and superstardom, on his own. This was after appearing in the pop remake of The Wizard of Oz, entitled The Wiz.

Although he was already at this point a star in the genre, the album Thriller placed him in the record books. He received 58 platinum records in 28 countries,





MOONWALKER

and in America he was awarded no less than 8 grammys. To date Thriller has sold over 40 million copies worldwide, and is still selling.

How does one follow that? Easy, one makes ones first feature length movie based on ones own records.

Moonwalker is Michael's first feature length film (having previously only done shorts, such as Thriller) and is titled after his best-selling autobiography — which is named after the dance that he has perfected so well. It deals with all the subjects that Michael has shown as being dear to his heart — youth, friendship, drug abuse, bad journalism, and villainy — and in true fairy-tale fashion, he takes many obstacles and shows how to overcome them (yep kids, this is all believable stuff. If you are confronted by a drug baron and his troops, just transform into a large robot and blow the heck out of them).

The plot follows Michael and three friends (one of which is Sean Lennon) through various sub-plots, all of which are interlinked by Mr. Big — an evil drug baron with an evil haircut. First prob that Mike faces is the journalists at a Hollywood studio, they are hungry for blood and wish to grab some Jackson negative (any resemblance between these journos and the cut-throats found at Argus is purely intentional).

He manages to elude them by wearing a rabbit mask, and in some smooth puppetry, he speeds away on a motorcycle until he finally escapes their ruthless pencils. This is not the only transformation that he undertakes in Moonwalker.

Like I said earlier, he also transforms himself into a very large Transformer-like robot, and even more unbelievably, a mammoth space ship, as which he finishes the battle with a few deft swivels of his thrusters. Moonwalker is definitely intended for kids, and has many charms which makes it ideal for such an audience.

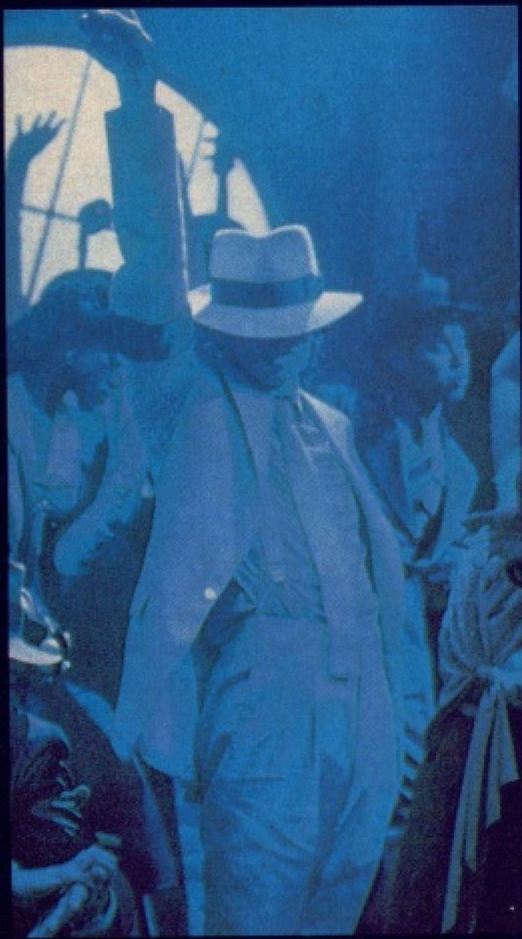
It also makes it ideal for a computer game. Which is just as well as US Gold has secured the licence and will pixelise Michael Jackson's exploits in time for November, and thus Christmas.

The game follows the plot of the film very closely and is split into 4 levels. The action is played in a maze-like game with a top-down view, although in-between each level there is a moderately large action sequence. It follows all the transformations, climaxing in a VERY large action sequence featuring the Spaceship Jackson.

The music throughout the movie is also going to be converted onto the home computer, with relevant song appearing in relevant sections, and the whole game is going to be very movie-esque. US Gold is very excited about this project and, with the help of the Keypunch Corporation of Minneapolis, Moonwalker is likely to be a success Worldwide (much like Michael himself).

If US Gold only sell 1% the amount of copies as the record Bad did, everybody up in Birmingham will be happy likkle bunnies.



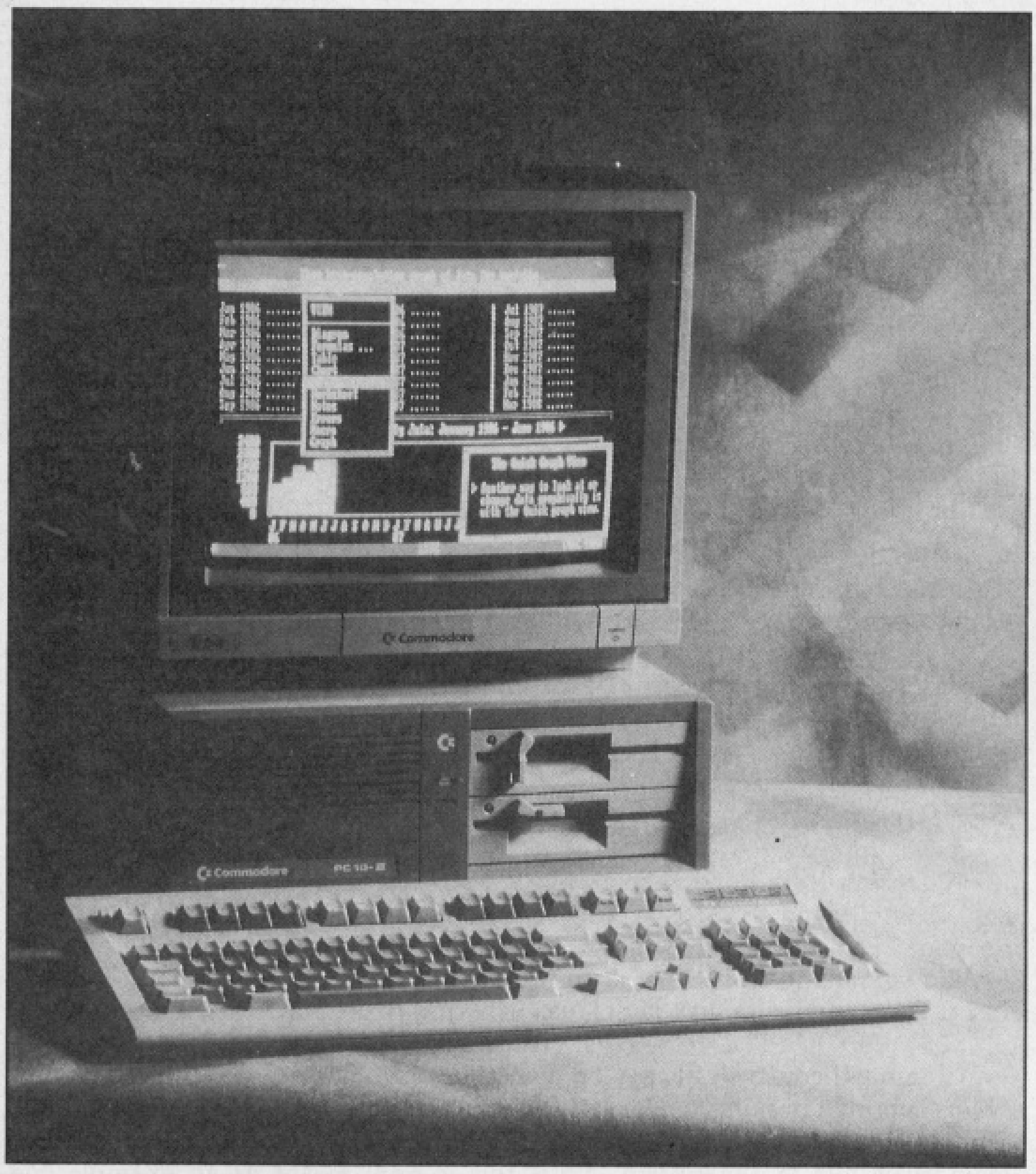








LIFE'S A DOS



Andrew Brown, the man around town, goes to PCs.

Welcome to PC Corner, the part of the magazine for all Commodore DOS users, whether fledglings or old hand. This month it's a mixed bag of mainly software reviews, plus an intro to batch files. First though, I'm going to kick off with a couple of news items.

Lotus corp (see Magellan review) has been busy lately. Not only has it got both 123 releases 2.2 and 3.0 onto the streets, but has upgraded the help available through its dealer network. The new system uses a CD-ROM disk called unimaginatively, CD/PROMPT. With over 10,000 pages of information on the disk, that time honoured excuse of 'Oh it's not in the manual, we'll have to check with head office' no longer holds any water.

With the intel 80486 chip now becoming available as upgrades for systems such as the IBM PS2, and AST Premium 386 machines, speculation over processor upgrades for other machines is rife. It seems however that commodore who only has 20Mhz '386 is not yet to be tempted, or was it caught out? Certainly the much rumoured 386SX machine is on the stocks, but what else?

Batch File Fun

It is often thought that MSDos computers do not have a programming language built in. In fact they do, the so-called Batch language, which really is just an extension of MSDos.

Batch programs are just like those you may have written in Basic, but there are differences. The commands available are somewhat limited, and each program is really a text file. However, some useful things can be done. For example with Autoexec.bat. This is the Batch program that controls the computer at start up, so it's very important . Much can be done with

Autoexec.bat, and I may cover the options in future columns, but for now here is a simple mod for you single drive users. The following text should be prepared with whatever editor you use, and saved as a text-only file.

```
  echo off
path=a:   ;c:
prompt $p$g
copy command.com c:
```

You should also prepare another text file with the following command:

```
Files = 20
Buffers = 20
device = Ramdrive.sys
Set comspec = C: command. com
```

Next, make a working copy of your boot disk and copy both text files to it. Also copy the file Ramdrive.sys to the disk. Rename the first file Autoexec.bat, and the second Config.sys. Reboot, and everything should go as normal, except for a message similar to this:

```
Microsoft Ramdrive Version 2.01 virtual disk c:
Disk size 64k
Sector size 512 bytes
Allocation unit 1 sectors
Directory entries 64
```

What you have done is created a RAM disk which becomes drive c;, and copied Command.com to it. You may well be wondering what this will do for you. The answer is that you should no longer see messages like this:

Invalid Command.com
Insert Command.com disk in default drive and strike any key when ready.

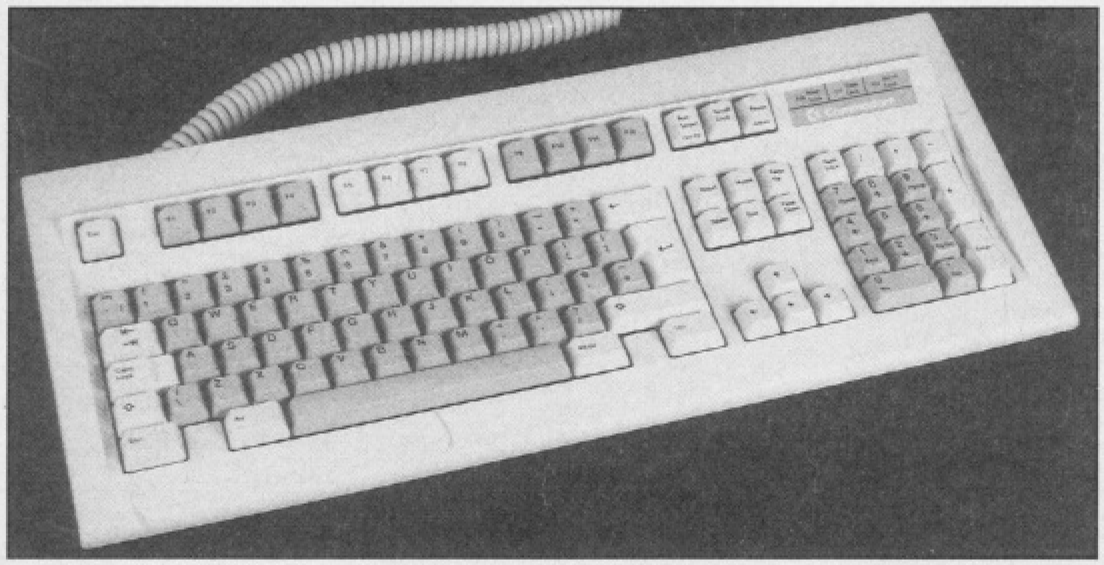
Command.com will always be available to the system, and irritating disk swaps kept to a minimum. Hard disk owners can still use this trick incidentally, as it does speed things up somewhat. The one drawback of course being that memory is lost to the system. Note, this is only meant as an example and some programs will not work under this configuration of DOS.

Typografica

Just about everybody these days has heard of DTP, however fewer people actually put the theory into practice. Reasons for this are complex. An important factor has been the gap between low-priced low-performance systems, and the more exclusive Postscript based kit. Some might regard this state of affairs as a bonus, preventing the perpetration of typographic disasters on the world.

One way of narrowing the gap is to provide the low end user with some of the excellent fonts hitherto only available to Postscript users. This GST have done, with their Typografica range of outline fonts. The normal way of acquiring these is by purchasing one of the two collections. Prime, consists of Sans, Serif, and Courier which is the equivalent of Helvetica, Times and Courier on Postscript printers. Standard, has all the rest, and is much more interesting, with such things as Zapf Dingbats and Sans Narrow. Together they make up the equivalent of the 13 fonts available as standard on Postscript printers. The two collections come complete with a three ring binder, manual, disks and poster showing the fonts available. Individual fonts are also available.

If you want to make use of the fonts, you have to install them first. This is a clumsy process at best, and irritating at worst. Everything has to be specified from menus and sub-menus, you can't just whizz around the screen selecting items at will. Also, as the program generates bit-mapped fonts, the time taken can be excessive. For example, I specified an extensive range of point sizes from 6 to 72 in a single style of one outline font. Typografica suggested 18 minutes 31 seconds to generate the fonts, which then occupied 3Mbyte on my hard drive. Of this, the 72 point style occupied no less than 1.5Mbyte. Simple mathematics then gave me a figure of 72Mbytes for the six fonts supplied as part of the standard collection. The moral has to be, use the minimum



number of fonts necessary to do the job, unless you have a massive hard disk. Unfortunately you are then severely hampered in your choice of fonts, effectively back to square one. And what happens if you wish to use the fonts with two or three different applications?

On the plus side, a large number of applications and output devices are supported including typesetting machines. These however can only be used if you specify the postscript names for the fonts when generating them.

My overall verdict; a cost-effective way of widening the scope of your DTP work, but really needs a large hard disk to get the most out of it.

Lotus Magellan

Magellan has been hailed as one of a new breed of DOS shells. What's a DOS shell you ask? Strictly speaking, they are a way of controlling DOS without using the system prompt. That includes everything from simple batch programs to MS Windows. A stricter definition however, would add the fact that some part should remain in memory while your programs are running. This allows the main section to be reloaded when your program terminates. By that definition, Magellan is the Rolls Royce of DOS shells. It has elements of artificial intelligence with its 'fuzzy' search routine and 'Hypertext' facilities that allow you to treat all the files on disk as one enormous database.

Magellan builds an Index of files stored on your hard disk, knows from a list of templates what is in those files displaying the contents accordingly. Dbase and Lotus 123 files are just two types it knows about.

You can search for data in files in several ways using the Explore option. Magellan's file viewers allows it to display the contents of the files in a form near to that of the creating applications. Thus Lotus 123 files are displayed in row and column format, DBase files as tables, and so on. Launch (F7) is another powerful command, because it not only allows you to start up programs from within Magellan, but also gives extensive control over the process. It does this by making use of the powerful Macro facility built into Magellan. Of course it's not perfect, but it could save you a lot of key strokes over the year.

All the other facilities, such as copying, deleting, renaming and printing files are also present, and as you would expect from such a polished product are well implemented.

Documentation is probably the most sumptuous I have ever seen. There is a ring bound manual, plus two small booklets, and all reek of class. However I found the content pedestrian, if thorough. Full marks though for Index and Glossary, essential for this kind of product.

Magellan is a well finished program, but what will be its uses? Clearly Lotus intends the product to fit in with its current base of corporate 123 users, but who else? Certainly anyone who needs to organise their hard disk, or where a number of people need to access data on one machine. But, the kind of disorganised people who do need Magellan are, by definition, the least likely to purchase it.

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ARVI



Rik Henderson, the man in the dayglo tights, deals a severe dose of comic capers!

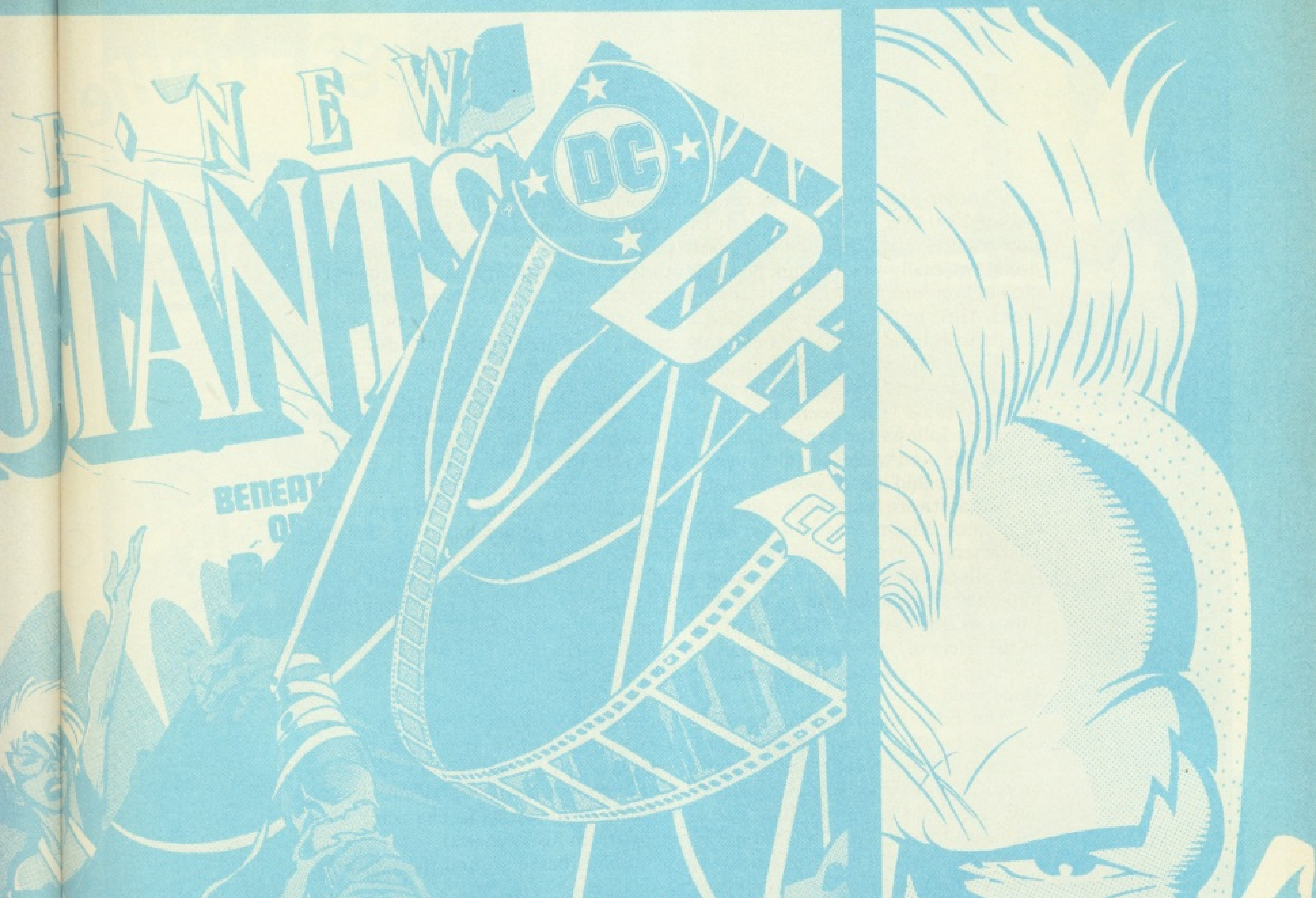
com'ic. 1.adj. (*ally*). Of or like comedy (*actor, opera*); designed to amuse, facetious, burlesque, funny, (*song, paper, history of Rome, incident*). **2.**n.(colloq.). Comedian,˜paper (*horror*, pictorial publication full of horrors). **al** a.(*-lly*), mirth-provoking, queer, odd;ˊ**al'ity** n.[L f. Gk (*Komos* revel)]

– The Pocket Oxford Dictionary, Fifth Edition

Although everybody must have a vague idea of what a comic is, I feel the dictionary entry above contains a phrase which sums up its definition perfectly. "Pictorial publication full of horrors" may not say 'Beano' to you, but we're moving into the 1990s. And the comic industry is coming with us.

Long gone are the days when children flocked to the newsagents to see if Spiderman had vanquished Doctor Octopus (again) and if Superman had pulverised Lex Luthor (again). Now dark landscapes are the settings for brutal crimes and many superheroes keep their boxer shorts inside their trousers. Batman has acquired weaponry (and lost a partner). Dan Dare (the great, great, great, great, etc. grandson of the original that is) has died and been resurrected. And even Judge Dredd has turned from being a facist psychotic killer into an old facist psychotic killer.

This can be put down to one thing: Comics are no longer for children only. A fact that became apparent when Viz was launched in December 1979. The publishers now claim to sell around 800,000 copies every two months. The content is crude, barbaric, and at best can be described as toilet humour, which goes half way to explaining why I (and another 799,999 dedicated readers) love it so much.



Another recent comic which has conformed one famous character to a more adult status is 'The Dark Knight Returns'. Written by Frank Miller – who is, at this very moment, writing the script and screenplay for Robocop 2 – it looks at the future of Batman, and plots a fitting end to the caped crusaders career. Many scenes from The Dark Knight were converted into cellular format via Tim Burton's Batman masterpiece, thus proving what a strong plot Frank had devised.

But these were just the first of the 'mature' readers comics. There was an enormous flood of them in 1987 and '88, and we can expect many more to come. One other of honourable note is 'Watchmen' by British comic author Alan Moore. It examines superheroes in a realistic society and comes to the conclusion that heroics is something frowned upon by a majority of 'real' people. Of course, like Dark Knight became Batman, Terry Gilliam has already signed on the dotted line to convert this piece of comic literature onto the cinema screens.

Both of these products came from American based DC Comics. There are of course many British comics that hold their own in the UK market. One such comic is 2000AD. Founded in 1977, it sought to replace The Eagle as a space-age action paper for young and old, fortunately it did far more than that.

It has established itself as the top of it's kind (although competition is very scarce) and it's characters are now household names (in my household anyway!). As from it's 650th issue, they should all become household names in America too, as it will be in the shops there at the same time as here.

Also under the 2000AD name is Crisis, a comic that seeks to educate whilst remaining enjoyable and not too heavy. Dealing with political and social values, it is incredibly well-drawn and it is a rare comic that will get me into a newsagent ready to receive a copy.

Another new magazine to come our way is Deadline, which is edited by two of 2000ADs greatest artists. It can be described as a more down-to-earth, pop-culture version of 2000AD, more than anything else, and it seems to be doing extremely well (having just held it's first birthday party at the Limelight club in London's West End). It contains several strips, such as the now infamous 'Tank Girl' by Jamie Hewlett, and a few interviews and features on up-to-the-minute items. Deadline is monthly and it comes highly recommended.

Where DC are seeking to update their characters, Marvel haven't quite got the idea yet. That said, Marvel UK has recently released an amusing little monthly titled 'The Sleeze Brothers'. This is a sort of Blues Brothers in the future. It follows the exploits of two private eyes in a city full of debauchery, crime, sex and violence (although not necessarily in that order). It is very humourous and is well worth seeking out.

The software houses have also decided to capitalise on the rise in popularity of comics. Virgin Mastertronic has announced two games based on famous characters – Silver Surfer is based on the Marvel superhero of the same name (he's silver and he's got a wacking great surf board on which he can fly!), and their second licence is Viz. They say that the latter will not be toned down as this may ruin the feel of the game, but the cover will display a sign to the effect of 'mature gamers only'.

Ocean, of course, has Batman – the movie, but it also has the rights to Watchmen.

The Edge has The Punisher (a vigilante driven by his family's death at the hands of a crime organisation) and The X-Men (a superhero troupe containing many rough and ready characters). It has also announced a few more to come next year – Daredevil (a blind superhero who is anti-drugs, and just about anti everything else as well), and Wolverine (a character who has large, very sharp claws that he can extend from his knuckles).

Empire has Doctor Doom's Revenge, which is based around the Fantastic Four's oldest and most feared enemy.

Rumour also has it that there will be new games based on (wait for it): Captain America, Judge Dredd, The Swamp Thing, X-Factor, The New Mutants, and Rogue Trooper. We can be guaranteed though that this will not be the end, there is a whole universe of licenses just waiting to be grabbed.





YOUR PROGRAMMER

CONTENTS

34 Sprite Priorities
Automatic control for sprite positions, as they wander the screen.

37 VAT Number Checker
Is that invoice valid? Check the VAT number printed with our easy-to-use program.

39 Moving the Screen
Relocate the screen in memory.

41 Special FX
Fade your text in and out, and produce effects for your programs.

43 Strung Along
Making use of the three $ basic functions.

46 Extending Basic 8
The eigth part of our on-going series, as it nears its impending end.

49 Proglock
Keep your privates private with this security program.

50 The User Port
Use the user port.

How to use the pull-out...
Remove from magazine and cut spine. Punch holes where indicated and insert in a ring binder for easy storage and long-term protection.

SPRITE PRIORITIES

Make use of the priority properties of your sprites

By J. Simpson

If you want to achieve a truly three-dimensional quality to your sprites here is an incredibly useful routine for your to use. It's very short, so there isn't endless lists of data to type in.

Examples of three-dimensional sprites which spring to mind are the various sport simulations, such as 'International Soccer.'

As you probably know, sprites have a definite priority arrangement in that the lower the sprite number the higher is its priority. This means that sprite 0 has the highest, through to sprite 7 which has the lowest.

Sprites with higher priority always display in front of those with a lower priority. This is fixed within the hardware of the VIC II chip, which means if you want to create a three-dimensional illusion, then a routine needs to be constructed which will manage the sprites by keeping 'foreground' sprites higher in priority.

To handle this, I decided that sprites lower down the screen would be considered as 'foreground' to those higher up the screen. I'm sure you know that the pixel map is arranged with the 'Y' coordinate running from 0 at the top of the screen, to 255 at the bottom. The Machine Language routine, SPRITE PRIORITIES, uses the 'Y' coordinate information to decide which sprite should be where; the sprite with the greater 'Y' value becoming sprite 0, and so on.

Within the routines

1. SPRITE PRIORITIES this is the ML routine which deals with checking and updating all the sprite positions and their priorities. If a sprite moves up the screen (or backwards into the picture), and in doing so it passes above (or behind) another sprite, then **sprite priorities** will swap the two sprites around, together with all data relevent to each (ie: Image, Mcm, Xpos, Ypos, Colours etc). This neatly holds together the illusion that a sprite's priority is changing – first passing in front of, then behind another sprite. This does, however, pose a tricky problem! Let's say that the joystick is being used to control one particular sprite element. Normally that control would be defined and controlled using one particular sprite – say, sprite 0. All that needs to be done is to peek and poke (or ML equivalent) with 'Y' coordinate information into sprite 0. However, should sprite 0 move up the screen and pass the next sprite, then CONTROL shifts to sprite 1, and if CONTROL carries on up the screen it might become sprite 2, 3, 4, 5, 6 or 7.

2. BASIC DEMO – For programmers, and to show the system working, the basic demo program outlines a demonstration of SPRITE PRIORITIES in action, as well as useful routines for the controlling of which sprites are where. When you 'RUN' the program (that is after loading SPRITE PRIORITIES, and typing 'NEW', then loading BASIC DEMO), eight sprites are displayed diagonally across the screen. The images are simple coloured blocks. Their default values are:

Block 1 = White
Block 2 = Red
Block 3 = Cyan
Block 4 = Purple
Block 5 = Green
Block 6 = Blue
Block 7 = Yellow
Block 8 = Orange

You can use the numerical keys (1-8) to select any one of the eight blocks. That block will now be under CONTROL, and can be manipulated around the screen using the joystick plugged into port 2.

If you study the listing, you will see that in the INITALISE routine (lines 68-78) variables 'N' and 'K' have been declared, and the two arrays F() and DS() dimensioned. At line 76 the arrays are filled – F() with 0 to 7 and DS() with the 'Y' coordinate value of each sprite, from 0 to 7.

The array F() holds the current position of the BLOCK (not the sprite) on the screen, and DS() – which derives from 'Dummy sprite' – holds the current 'Y' location of where each sprite would be, should there be no SPRITE PRIORITIES manipulation.

The variable 'K' is used to shift joystick CONTROL over the block selected from the numerical key input. A loop checks through the F() array to find the current screen position in relationship to the sprite. For example, BLOCK 5 might be at the bottom of the screen, and so it would be sprite 0. Where 'N' is set to equal the actual sprite value – in the foregoing example, 0. When the joystick is moved up or down, program control will call either JOYSTICK UP (commencing at line 21) or JOYSTICK DOWN (line 32). Let's say 'up' is the selection. First DS(K) is decremented (K=Block being moved), and the screen

parameters are checked (line 22). Then the updated value in DS(K) is poked into the 'Y' register of the sprite holding the data for that BLOCK: 'N' holds the sprite number.

Next, the CONTROL sprite's 'Y' coordinate is checked against the next lesser prioritised sprite 'Y' coordinate. If CONTROL is greater, then it maintains priority and so the program skips lines 25-27 and returns to MAINLOOP – no more needing to be done. However, should the coordinate value now be less, then line 25 calls the ML routine SPRITE PRIORITIES, where priority and all relevent sprite data is toggled from one to the other. On return from the ML routine, 'N' is now incremented to the next highest sprite number. This is followed by an error trap, and UPDATE F(lag) ARRAY (line 64), which will update F(N) for the current sprite position. Moving down the screen is the reverse of the above – check out lines 32-39. Left and right have no effect upon priority, and so these are standard routines to Peek and Poke 'X' coordinates.

A Stage Further

To take things a stage further and have multiple sprite movement on the screen, the variable 'N' would need to become an eight element array. Each image, block, or whatever, would be given a constant value from 0 to 7, and when the program updates 'Y' coordinates for each element, N(Element Number) would be used. This could be followed by a line such as:

ON (ELEMENT NUMBER) **GOSUB** (PARAMETERS)

Here subroutines would handle differing images, or elements, and/or situations.

I have not incorporated a collision detect routine within the Basic demo as the main purpose is to show how effective SPRITE PRIORITIES is, and to offer a demonstration of a method of control. Collision detect should operate quite normal without any problems. For ML programmers, the conversion of the Basic demo routines into source should prove to be quite elementary.

Sprite Image Data

I have included a listing of data for sprite images which will display, numbered (1 to 8), three-dimensional, coloured boxes. The numbers corresponding with numerical keys and the colours as before. Should you decide to use these images, type in the basic loader and data lines, and save to tape/disk. You will now have to make some changes to the BASIC DEMO program.

First, delete line 70 entirely.
Change line 71 to read:
POKEP + C, PO + C
Remove the REM from line 72 and type:
POKEV + 28, 255
Remove the REM from line 73 and type:
POKEV +37, 11
Remove the REM from line 74 and type:
POKEV + 38, 12

This enables the multicolour mode and sets the colours to Grey 1 and Grey 2.

Getting it all in

Sprite Priorities – Type in and save the Basic loader program.
Sprite Image Data – If you are going to use the sprite data which is included, then type in and save this listing also.
Basic Demo – Type this basic program in. If you are going to use the additional sprite data, make the necessary changes outlined above and save it.

Running the Demo

First load and run SPRITE PRIORITIES then type 'NEW'. If you are using sprite image data then load this is and type 'NEW'.

Now you can load and RUN the BASIC DEMO program. Remember, keys 1 to 8 will select the BLOCK you wish to control with a joystick plugged into port 2. Well, that's about it. I'm off to the pub for a pint. Hope you like SPRITE PRIORITIES, and can utilise it and expand upon it...

```
PROGRAM:SPRITE PRIORITIES

B3  0 PRINT"[CLR,DOWN2,SPC3]***
    - LOADING/CHECKING DATA - **
    *"
9B  1 DIMEA(20):C1=0:DL=100:IN=1
    :LE=51:Q=8:AD=52832:DEFFNA(Z
    )=DL+(X*IN)
3C  2 FORX=0TOLE:CS=0:FORC=0TOQ-
    1:READD:CS=CS+D
53  3 IFD<256THEN6
08  4 IFC=Q-1THENPRINT"[CLR,DOWN
    2]  DATA QUANTITY ERROR IN L
    INE:-"FNA(Z):STOP
38  5 EA(C1)=FNA(Z):C1=C1+1
A4  6 POKEAD+X*Q+C,D:NEXT
93  7 READD:IFD<>CSTHENEA(C1)=FN
    A(Z):C1=C1+1
8A  8 NEXT
21  9 X=C1:IFC1=0THENPRINT"[CLR,
    DOWN2]  DATA IS ERROR FREE":
    GOTO12
C8  10 PRINT"[CLR,DOWN2,RIGHT11]
    DATA ERROR LIST[DOWN]"
5F  11 FORC=0TOX:PRINTEA(C)"*";:
    NEXT
0A  12 REM ***  TO CALL FROM WIT
    HIN BASIC PROGRAM - USE SYS5
    2832
CE  13 REM ***  TO CALL FROM WIT
    HIN MACHIN LANGUAGE PROGRAMS
     - USE JSR $CE60
8E  14 END
77  100 DATA32,168,206,32,178,20
    6,32,200,1054
5A  101 DATA206,32,91,207,169,29
    ,160,208,1102
CF  102 DATA32,149,206,32,127,20
    7,169,23,945
E1  103 DATA160,208,32,149,206,3
    2,127,207,1121
D1  104 DATA169,28,160,208,32,14
    9,206,32,984
6D  105 DATA127,207,169,16,160,2
    08,32,149,1068
0E  106 DATA206,32,127,207,96,14
    1,128,207,1144
2E  107 DATA141,146,207,141,172,
    207,140,129,1283
C6  108 DATA207,140,147,207,140,
    173,207,96,1317
DB  109 DATA160,44,169,0,153,191
    ,207,136,1060
0D  110 DATA16,250,162,7,160,15,
    185,0,795
55  111 DATA208,157,175,207,136,
    185,0,208,1276
F1  112 DATA157,183,207,202,136,
    16,239,96,1236
31  113 DATA160,0,185,175,207,14
    1,199,207,1274
39  114 DATA185,183,207,141,208,
    207,185,39,1355
7F  115 DATA208,141,217,207,185,
    248,7,141,1354
14  116 DATA226,207,185,236,207,
    141,235,207,1644
A3  117 DATA162,8,189,191,207,22
    1,190,207,1375
F0  118 DATA240,5,144,3,32,0,207
    ,202,833
8C  119 DATA208,240,200,192,8,20
    8,203,96,1355
D9  120 DATA189,190,207,141,252,
    207,189,191,1566
00  121 DATA207,157,190,207,173,
    252,207,157,1550
EB  122 DATA191,207,189,199,207,
    141,252,207,1593
D4  123 DATA189,200,207,157,199,
    207,173,252,1584
7E  124 DATA207,157,200,207,189,
    208,207,141,1516
00  125 DATA252,207,189,209,207,
    157,208,207,1636
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06   126 DATA173,252,207,157,209,
     207,189,217,1611
1F   127 DATA207,141,252,207,189,
     218,207,157,1578
9C   128 DATA217,207,173,252,207,
     157,218,207,1638
1C   129 DATA189,226,207,141,252,
     207,189,227,1638
98   130 DATA207,157,226,207,173,
     252,207,157,1586
FD   131 DATA227,207,96,160,0,162
     ,0,189,1041
4C   132 DATA200,207,153,0,208,20
     0,189,191,1348
C2   133 DATA207,153,0,208,189,20
     9,207,157,1330
6C   134 DATA39,208,189,218,207,1
     57,248,7,1273
6B   135 DATA232,200,192,16,208,2
     25,96,173,1342
A4   136 DATA0,16,240,42,201,255,
     240,38,1032
E3   137 DATA160,0,140,252,207,18
     5,227,207,1378
1E   138 DATA170,173,0,16,74,202,
     16,252,903
BB   139 DATA144,9,173,252,207,25
     ,244,207,1261
69   140 DATA141,252,207,200,192,
     8,208,229,1437
38   141 DATA173,252,207,141,0,16
     ,96,0,885
BD   142 DATA0,0,0,0,0,0,0,0,0
BC   143 DATA0,0,0,0,0,0,0,0,0
C3   144 DATA0,0,0,0,0,0,0,0,0
C2   145 DATA0,0,0,0,0,0,0,0,0
C1   146 DATA0,0,0,0,0,0,0,0,0
C0   147 DATA0,0,0,0,0,0,0,0,0
C7   148 DATA0,0,0,0,0,0,0,0,0
CA   149 DATA0,0,0,0,0,1,2,3,6
1A   150 DATA4,5,6,7,1,2,4,8,37
86   151 DATA16,32,64,128,0,0,251
     ,251,742
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```
PROGRAM:SPRITE IMAGE DATA

59   0 PRINT"[CLR,DOWN2,SPC5]***
     LOADING/CHECKING DATA ***"
62   1 DIMEA(20):C1=0:DL=100:IN=1
     :LE=64:Q=8:AD=12288:DEFFNA(Z
     )=DL+(X*IN)
3C   2 FORX=0TOLE:CS=0:FORC=0TOQ-
     1:READD:CS=CS+D
53   3 IFD<256THEN6
08   4 IFC=Q-1THENPRINT"[CLR,DOWN
     2]  DATA QUANTITY ERROR IN L
     INE:-"FNA(Z):STOP
38   5 EA(C1)=FNA(Z):C1=C1+1
A4   6 POKEAD+X*Q+C,D:NEXT
93   7 READD:IFD<>CSTHENEA(C1)=FN
     A(Z):C1=C1+1
8A   8 NEXT
21   9 X=C1:IFC1=0THENPRINT"[CLR,
     DOWN2]  DATA IS ERROR FREE":
     GOTO12
CB   10 PRINT"[CLR,DOWN2,RIGHT11]
     DATA ERROR LIST[DOWN]"
5F   11 FORC=0TOX:PRINTEA(C)"*";:
     NEXT
83   12 REM
82   13 REM
8E   14 END
59   100 DATA15,255,240,63,255,24
     0,255,255,1578
51   101 DATA240,170,170,240,170,
     170,240,170,1570
68   102 DATA106,240,170,106,240,
     169,106,240,1377
28   103 DATA169,106,240,169,106,
     240,169,106,1305
32   104 DATA240,169,106,240,169,
     106,240,169,1439
FE   105 DATA106,240,169,106,240,
     169,106,240,1376
24   106 DATA169,106,192,170,170,
     192,170,170,1339
98   107 DATA0,0,0,0,0,0,0,0,0
E1   108 DATA15,255,240,63,255,24
     0,255,255,1578
CB   109 DATA240,170,170,240,170,
     170,240,165,1565
85   110 DATA90,240,149,86,240,15
     4,150,240,1349
48   111 DATA170,166,240,170,150,
     240,165,86,1387
F5   112 DATA240,149,90,240,150,1
     70,240,154,1433
96   113 DATA166,240,154,166,240,
     149,86,240,1441
2C   114 DATA149,86,192,170,170,1
     92,170,170,1299
A0   115 DATA0,0,0,0,0,0,0,0,0
A9   116 DATA15,255,240,63,255,24
     0,255,255,1578
7F   117 DATA240,170,170,240,170,
     170,240,149,1549
86   118 DATA86,240,149,86,240,15
     4,150,240,1345
93   119 DATA170,90,240,169,106,2
     40,169,90,1274
28   120 DATA240,170,150,240,170,
     166,240,154,1530
47   121 DATA166,240,150,150,240,
     149,86,240,1421
60   122 DATA165,90,192,170,170,1
     92,170,170,1319
A8   123 DATA0,0,0,0,0,0,0,0,0
71   124 DATA15,255,240,63,255,24
     0,255,255,1578
09   125 DATA240,170,170,240,170,
     170,240,170,1570
3A   126 DATA90,240,169,90,240,16
     9,90,240,1328
7D   127 DATA165,154,240,165,154,
     240,150,154,1422
19   128 DATA240,149,86,240,149,8
     6,240,170,1360
9E   129 DATA154,240,170,154,240,
     170,86,240,1454
E7   130 DATA170,86,192,170,170,1
     92,170,170,1320
B0   131 DATA0,0,0,0,0,0,0,0,0
B9   132 DATA15,255,240,63,255,24
     0,255,255,1578
0F   133 DATA240,170,170,240,170,
     170,240,149,1549
D6   134 DATA86,240,149,86,240,15
     4,150,240,1345
F6   135 DATA154,170,240,149,86,2
     40,149,86,1274
20   136 DATA240,170,150,240,170,
     166,240,150,1526
37   137 DATA166,240,150,150,240,
     149,86,240,1421
84   138 DATA149,86,192,170,170,1
     92,170,170,1299
B8   139 DATA0,0,0,0,0,0,0,0,0
C1   140 DATA15,255,240,63,255,24
     0,255,255,1578
EB   141 DATA240,170,170,240,170,
     170,240,165,1565
60   142 DATA90,240,149,90,240,15
     0,150,240,1349
AA   143 DATA154,150,240,154,170,
     240,149,90,1347
AD   144 DATA240,149,86,240,150,1
     50,240,154,1409
3F   145 DATA166,240,150,150,240,
     149,86,240,1421
28   146 DATA165,90,192,170,170,1
     92,170,170,1319
C0   147 DATA0,0,0,0,0,0,0,0,0
09   148 DATA15,255,240,63,255,24
     0,255,255,1578
9F   149 DATA240,170,170,240,170,
     170,240,149,1549
06   150 DATA86,240,149,86,240,15
     0,150,240,1341
6A   151 DATA170,154,240,170,90,2
     40,170,90,1324
DD   152 DATA240,170,90,240,170,9
     0,240,169,1409
2E   153 DATA106,240,169,106,240,
     169,106,240,1376
14   154 DATA169,106,192,170,170,
     192,170,170,1339
28   155 DATA0,0,0,0,0,0,0,255,25
     5
D1   156 DATA15,255,240,63,255,24
     0,255,255,1578
BB   157 DATA240,170,170,240,170,
     170,240,165,1565
65   158 DATA90,240,149,86,240,15
     0,150,240,1345
48   159 DATA154,166,240,150,150,
     240,165,90,1355
90   160 DATA240,165,90,240,150,1
     50,240,154,1429
6F   161 DATA166,240,150,150,240,
     149,86,240,1421
78   162 DATA165,90,192,170,170,1
     92,170,170,1319
D0   163 DATA0,0,0,0,0,0,0,0,0
D7   164 DATA0,0,0,0,0,0,0,0,0
```

```
PROGRAM:BASIC DEMO

BF   0 REM * * * * * * * * ** * * *
       * * * *
AE   1 REM *
             *
78   2 REM *    SPRITE  PRIORITI
     ES      *
50   3 REM *         A BASIC DEMO
             *
47   4 REM *            BY BONES
             *
AA   5 REM *
             *
B9   6 REM * * * * * * * * ** * * *
       * * * *
30   7 :
32   8 :
33   9 :
ED   10 GOSUB66:REM  * INITIALISE

31   11 :
0E   12 REM ***** PROGRAM MAINLOO
     P *****
37   13 :
1A   14 GOSUB55:REM  * KEYPRESS
D5   15 JV=PEEK(JS)AND15:IFJV=15T
     HEN14
98   16 GOSUB21:REM EXECUTE JOY C
     OMMANDS
```

```
FD   17 GOTO14
28   18 :
63   19 REM       *** JOYSTICK UP *
     **
2E   20 :
91   21 IFJV<>14THEN32
A4   22 DS(K)-DS(K)-4:IFDS(K)<50T
     HENDS(K)-50
71   23 POKEV+1+(N*2),DS(K)
8D   24 IFPEEK(V+3+(N*2))<-PEEK(V
     +1+(N*2))THEN28
42   25 SYS52832:REM * PRIORITISE
      SPRITES
22   26 N-N+1:IFN>7THENN-7
BA   27 IFN<>0THENGOSUB64
92   28 RETURN
27   29 :
CD   30 REM     *** JOYSTICK DOWN *
     **
25   31 :
19   32 IFJV<>13THEN43
CA   33 DS(K)-DS(K)+4:IFDS(K)>208
     THENDS(K)-208
9A   34 POKEV+1+(N*2),DS(K)
73   35 IFPEEK(V+1+(N*2))<-PEEK(V
     -1+(N*2))THEN39
B7   36 SYS52832:REM * PRIORITISE
      SPRITES
E6   37 IFN<>0THEN GOSUB64
61   38 N-N-1:IFN<0THENN-0
A9   39 RETURN
12   40 :
A4   41 REM  *** JOYSTICK LEFT/RI
     GHT ***
10   42 :
58   43 Y-PEEK(V+(N*2))
17   44 IFJV<>11THEN47
48   45 Y-Y-6:IFY<24THENY-24
E2   46 GOTO49
DB   47 IFJV<>7THEN23
69   48 Y-Y+6:IFY>255THENY-255
94   49 POKEV+(N*2),Y
BC   50 RETURN
09   51 :
99   52 REM   *** SELECT-A-SPRITE
      ***
8C   53 REM      *   KEYS 1 TO 8
      *
0C   54 :
09   55 GETK$:X-VAL(K$):IFX<1ORX>
     8THEN60
19   56 K-X-1
14   57 FORC-0TO7
C6   58 IFF(C)-KTHENN-C
B9   59 NEXT
B2   60 RETURN
07   61 :
26   62 REM  *** UPDATE F(LAG) AR
     RAY ***
05   63 :
0E   64 Z-F(N):F(N)-F(N-1):F(N-1)
     -Z:RETURN
7B   65 :
94   66 REM       *** INITIALISE **'
     *
79   67 :
8B   68 POKE53280,0:POKE53281,0:P
     RINT"[CLR,GREEN]"
79   69 V-53248:JS-56320:DP-2040:
     PO-192:DIMDS(7),F(7):N-0:JV-
     0:K-0:
71   70 FORC-0TO64:POKE12288+C,25
     5:NEXT:REM * FILL SPRITE IMA
     GES WITH BLANKS
00   71 FORC-0TO7:POKEDP+C,PO:REM
      * DATA POINTERS
C7   72 REM
C6   73 REM
C5   74 REM
FA   75 POKEV+39+C,C+1:REM * COLO
     UR SPRITES
11   76 NEXTC
0F   77 X-50:FORC-0TO14STEP2:POKE
     V+C,X:X-X+10:NEXT:REM * POKE
      X COORDS
D7   78 Y-200:FORC-1TO15STEP2:POK
     EV+C,Y:Y-Y-10:NEXT:REM * POK
     E Y COORDS
04   79 FORC-0TO7:DS(C)-PEEK(V+1+
     (C*2)):F(C)-C:NEXT:REM * SET
      UP ARRAYS
62   80 POKEV+21,255:REM * ENABLE
      SPRITES
DF   81 RETURN
```

PROGRAMMING

VAT NUMBER CHECKER

Make sure your VAT invoice is a bonefide invoice with this simple checking program

By R. Ellis

Have you ever wondered whether that 15 per cent VAT added to your bill really does go go the Taxman? Are you worried that the plumber's bill, scrawled in pencil on the back of a cigarette packet, may not be genuine? Well worry no more! With the aid of this simple little Basic program,

you can now know for sure that the firms you deal with are decent, honest and true, Well, actually you can only use it to find out whether the VAT numbers they put on their invoices are genuine or not. But this does go quite a long way towards proving their crudentials. You will, once you start using this program as a regular part of your book keeping routine, sleep more easily at night, safe in the knowledge that you haven't forked out fifteen per cent over the odds for your goods, and that the Taxman won't be claiming you've cheated him with phony invoices.

The program is written in Basic, and will run on the C64, C128, Plus 4 and C16. To use it, simply enter the nine digit VAT number and press return. The program will respond with the appropriate message:

VAT number is valid

or:

VAT number is not valid

Simplicity itself! The program is foolproof, objecting to any input which is not a nine digit number. If such an input is attempted, an appropriate error message will be printed before the program reports that the VAT number is not valid.

The program is in two parts, to make customisation or integration as a subroutine into your own programs easier. The first part, lines 100 to 180, inputs the VAT number, sends it to the subroutine that actually checks the number, and then interprets and prints the result. It then asks whether the user wishes to check another number. If they do, the process is repeated. If not, the program ENDs on line 180. The second part of the program, line 200-260, contains the checking routine itself.

The checking routine returns the result of its check in two variables: V and E. If V=0, the VAT number is not valid. If V=-1, the VAT number is valid. However, before the validity of the number is checked, the input itself is checked for errors. If E is not equal to zero upon return from the routine, it means that such an error has been detected. If E=1 the input contains less than nine characters (the length of any VAT number). If E=2 the input contains more than nine characters. If E=3 the input contains non-numeric characters. If any of these errors are detected, V is always set to zero, since the input could not have been a genuine VAT number. It should be noted that spaces are stripped from the input before it is checked. This usefully enables VAT numbers to be input inclusive of spaces, as they so often appear on invoices. Upon return from the surbourine, V$ will contain the original input, stripped of spaces.

The whole program can be turned into a single subroutine by simply replacing END in line 180 with RETURN. However, should you wish to use only the checking subroutine (lines 200-260), then the VAT number to be checked must first be put into A$ before executing a GOSUB to the routine. As we have seen, the result of the check will be returned in variables V and E. Since there are no GOTOs within the checking subroutine, renumbering it for incorporation into one's own programs is simplicity itself.

The calculation used in this program has been extensively tested, and is a form of the calculation used by the Tax Office to create the VAT numbers in the first place. For obvious reasons, it was thought rather counter productive to include that calculation in this program. As an incidental observation, it would appear that using their present system, it is only possible for the Tax Office to issue a maximum of ten million VAT numbers.

PROGRAM:VAT CHECKER

```
26   100 REM * * * VAT NUMBER CHE
     CKER * * *
24   110 E$(1)="TOO FEW":E$(2)="T
     OO MANY":E$(3)="NON-NUMERIC"
48   120 A$="":INPUT"ENTER VAT NU
     MBER";A$:IFA$=""THENPRINT"NO
      INPUT":GOTO150
08   130 GOSUB200:IFE<>0THENPRINT
     "ERROR: INPUT HAS "E$(E)" CH
     ARACTERS"
71   140 PRINT"VAT NUMBER IS "LEF
     T$("NOT ",ABS(4*(V=0)))"VALI
     D"
E5   150 PRINT"TRY AGAIN (Y/N) ?
     ";
EF   160 GETQ$:IFQ$<>"Y"ANDQ$<>"N
     "THEN160
CB   170 PRINTQ$:IFQ$="Y"THEN120
34   180 END
EB   200 REM * * * CHECK ROUTINE
     * * *
44   210 V$="":FORA=1TOLEN(A$):V$
     =V$+MID$(A$,A,ABS(MID$(A$,A,
     1)<>" ")):NEXT
1F   220 V=0:E=0:B=0:IFLEN(V$)<>9
     THENE=ABS(LEN(V$)>9)+1:RETUR
     N
33   230 FORA=1TO9:IFA<8THENB=B+V
     AL(MID$(V$,A,1))*(9-A)
D7   240 IFMID$(V$,A,1)<"0"ORMID$
     (V$,A,1)>"9"THENE=3:A=9
7B   250 NEXT:IFE<>0THENRETURN
E2   260 V=ABS(B-(INT(B/97)+1)*97
     )=VAL(RIGHT$(V$,2)):RETURN
```

MOVING THE SCREEN

by Ewan Villiers

There are many great myths in the world such as Atlantis, UFO's and, probably the greatest of them all, the difficulty of moving the text and character memory round. This program has been written to end the last of those myths.

Moving the text screen has many uses, take for example menus in adventures and windows in word processors. These must not harm the text beneath them and one method of doing this is to move the screen under interrupts (if the menu isn't over the text it can't harm it). This program will also allow you to make small alterations to the character set without needing to use a character designer.

I have included two versions of this program in the listings. The first is a machine code version (for speed) and the second a Basic listing (for ease of understanding). All lazy readers should note that the Basic listing can be typed in and compiled to save messing around with data statements.

The programme requires 3 variables:-

1. A Complex Interface Adaptor Bank (CIA)
2. A screen pointer within the bank
3. A character pointer

THE C.I.A. BANK:
The chip which looks at the memory can only 'see' 16K at one time so this sets the block to be 'seen'.

SCREEN POINTER:
The C.I.A. bank picks out a block of 16K. The screen pointer cuts this into 1K blocks which mark the start of each screen.

CHARACTER POINTER:
This is like the screen pointer except that, as the primary character set is 2K long, it is cut into 2K blocks (I haven't copied the second set so try changing to it when you run the program).

This is all you need to know to run the program (the addresses of the parameters are in the listing). But if you wish to understand the program, read on.

Changing the C.I.A. BANK (lines 270-290)

The first thing to note about this is that the bank numbers run in the wrong order. The number 0 denotes the fourth block (49152-65535) and the number 3 denotes the first block (0-16384). This is sorted on line 80 by subtracting three from the bank number.

It should also be noted that before the bank can be changed, the C.I.A. must be set for input. This is done by ORing 56578 (and 252) with the bank number (0-3). The only thing left to do is to inform the ROM that you have moved the screen (it is another bank now). The location 648 holds the screen address dividedby 255. To inform the ROM, you need to OR 648 (and 63) with 64* the video bank. Once this is done the bank is changed and you can change the screen address.

Changing the Screen Address (lines 340-50)

This is easier than changing the C.I.A. bank. The upper 4 bits of address 53272 hold the screen pointer so you just OR 53272 (and 15) with 16* the screen pointer. Again, the ROM must be informed of the screen's movement. This is accomplished by ORing 648 (and 192) with 4* the screen pointer. The screen has now been moved and you can now move the character set.

Changing the character address (line 400)

This is the easiest part of the program. The lower 4 bits of 53272 hold the character pointer. As the character pointer rises in 2K blocks, twice the pointer is stored there. This is done by ORing 53272 (and 241) with 2* the character pointer.

The C.I.A. screen and characters have now been moved but you still can't use this program because you have not copied the character set yet.

Copying the character data (lines 180-230)

While this is not difficult, it is the most difficult part of this program.

The difficulty is in looking at the character ROM and making sure you are not interrupted. These problems are solved by two pokes, one to address 56334, to ensure that you are not interrupted, and the other to address 1 to allow you to look at the character ROM. The rest of this part of the program just copies memory and sets addresses 1 and 56334 back to their original values.

128 Users

'Doing this in Basic is much easier for 128 users. The process of copying the character ROM only requires you to use the command Bank14 to gain access to the character ROM but a full guide to this can be found on pages 260-263 of the 128 reference guide.

The Machine code program

This is a short program encoded in data statements which has only 2 major differences from the Basic program.

The first difference is that while in the basic program numbers are entered from 1 to n, in the machine code version they must be in the form 0 to N or the program will not work.

The second difference is in the order of the subroutines. In this program, the screen moving routine is last, so it can be called upon independently by an SYS command (SYS49364).

The position of the parameters (addresses 49152-54) is shown in the listing, as are the SYS addresses, so all I can say now is "happy programming".

MACHINE CODE

```
10 REM *********************************
20 REM *   SYS 49158 to move CIA       *
30 REM *   SYS 49364 to shift screen   *
40 REM *   49152 = screen pos (0-15)   *
50 REM *   59153 = character pos (0-7) *
60 REM *   49154 = C.I.A. bank (0-3)   *
70 REM *   Program ends at 49420       *
80 REM *********************************
90 FOR x = 0 to 242 : READ A  : POKE
94158+x,a :NEXT
100 DATA   56,169,3,237,2,192,141,3,192,
           169,0,174,2,192,240,6
110 DATA   24,105,64,202,208,251,141,5,
           192,169,0,174,1,192,240,6
120 DATA   24,105,8,202,208,251,109,5,
           192,141,5,192,169,0,141,4
130 DATA   192,169,254,45,14,220,141,14,
           220,169,251,37,1,133,1,173
140 DATA   4,129,133,251,173,5,192,133,
           252,169,0,133,253,169,208,133
150 DATA   254,162,8,160,177,253,145,251
           ,200,208,249,230,252,230,254
160 DATA   202,208,246,169,4,5,1,133,1,
           169,1,13,14,220,141,14
170 DATA   220,169,3,13,2,221,141,2,
           221,169,252,45,0,221,13,3
180 DATA   192,141,0,221,173,2,192,10,10,
           10,10,10,10,133,255,173
190 DATA   136,2,41,63,5,255,141,136,2,
           173,0,192,10,10,10,10
200 DATA   133,255,173,24,208,41,15,5,
           255,141,24,208,173,0,192,10
210 DATA   10,133,255,173,136,2,41,192,5,
           255,141,136,2,173,1,192
220 DATA   10,133,255,173,24,208,41,241,
           5,255,141,24,208,96,173,0
230 DATA   192,10,10,10,10,133,255,173,
           24,208,41,15,5,255,141,24
240 DATA   208,173,0,192,10,10,133,255,
173,136,2,41,192,5,255,141,136,2,96
```

BASIC

```
10  input"SCREEN POSITION(1-16):";s%
20  IF s%>16 or s%<1 THEN 10
30  INPUT"CHARACTER POSITION (1-8):";c%
40  IFc%>8 ORc%<1 THEN 30
50  INPUT"BANK(1-4):";b%
60  IF b%>4 OR b%<1 THEN 50
70  s%=s%-1:c%-1:b%=b%-1
80  vb%=3-b%
90  ca=16384*b%+2048*c%
100 GOSUB180
110 GOSUB270
120 GOSUB340
130 GOSUB400
135 END
140 REM *********************************
150 REM *   Copy characters             *
160 REM *********************************
170 POKE56334,PEEK(56334)AND 254
180 POKE 1, PEEK(1) AND 251
190 FOR 1=0 TO 521: POKE CA+1,
    PEEK(53248+1):NEXT
200 POKE 1, PEEK(1) OR 4
210 POKE 56334, PEEK(56334) OR 1
220 RETURN
230 REM *********************************
240 REM *   SET C.I.A. BANK             *
250 REM *********************************
260 POKE 56578, PEEK(56578) OR 3
270 POKE 56576, (PEEK(56576)AND 252) OR
VB%
280 POKE 648,(PEEK(648)AND 63) OR(B%*64)
290 RETURN
300 REM *********************************
310 REM *    SET SCREEN POINTER         *
320 REM *********************************
330 POKE 53272,(PEEK(53272)AND 15) OR
    (16*S%)
340 POKE 648, (PEEK(648)AND 192)OR(S%*4)
350 RETURN
360 REM *********************************
370 REM *    SET CHARACTER POINTER      *
380 REM *********************************
390 POKE 53272, (PEEK(53272)AND 241) OR
    (2*C%)
400 RETURN
```

SPECIAL FX

Produce those colour fades with this simple to use program

By R. Hoben

If you have ever looked that little bit closer at a piece of software, you will notice many little touches that add a little bit more to the presentation. These touches can be anything from swirling sprites to colour effects. In this article I would like to discuss the use of colours to produce a fade effect, which when used in conjunction with your own program can create great title and instruction screens.

The first thing we must define is: What exactly is a fade? A fade is basically where something, be it a sprite, gradually appears or disappears into the background. When an item appears, it is known as a fade-in and when it disappears, a fade-out.

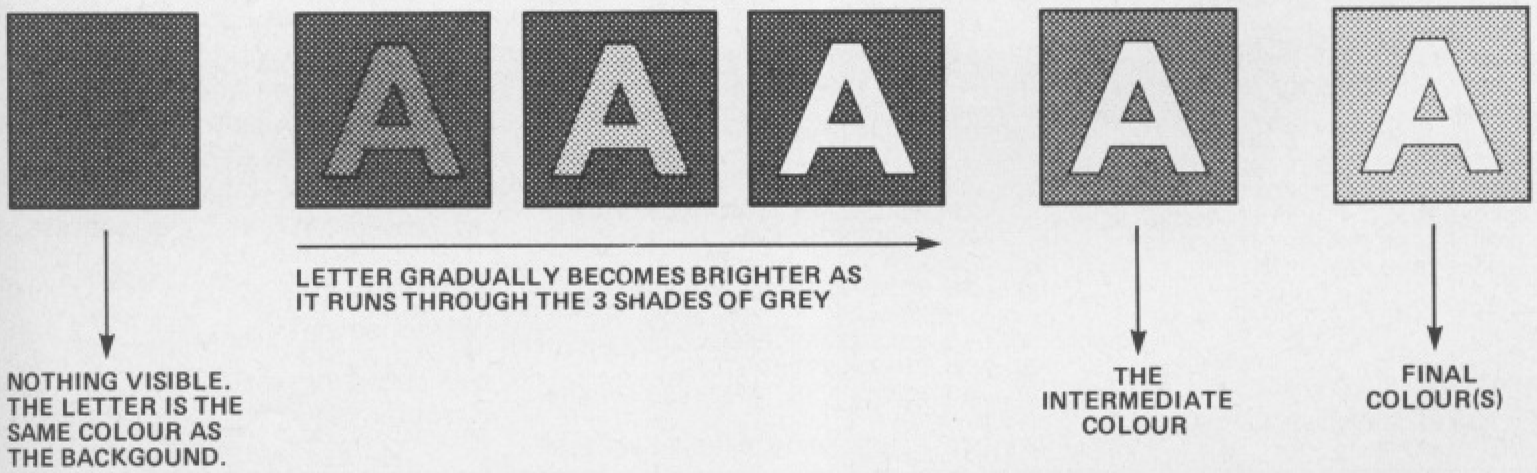
In order to make the item fade, we must cycle it through a sequence of colours. To help you understand this, we will take a practical example. I want an instruction screen faded in from a black background and the instructions to end up in the colour yellow. We must now create the necessary colour sequence. The first colour should be the background colour – which in this case is black ($00). We now want the text to gradually move from dark to light. The colours best suited for this are the three grey colours. So we add: Dark grey ($0B), Medium grey ($0C) and light grey ($0F).

Next we have an intermediate colour, which in this case is white ($00). This intermediate colour is preferably the opposite of the background. Lastly we put our final colour in which is yellow ($07). If we had chosen the final colour to be light red then we could have put dark red in after white and then light red in order to provide a smoother colour transition. If you look at diagram 1 then you will see this whole example simplified.

Hopefully you should have followed all that. If you look at diagram 2, you will see the complete sequence for our example. So how do you use this sequence in your own programs?

If you type in FADER LOADER, which is in Basic, and run it, it will generate a program on disk called FADER.MC. Now in your Basic or M/C program all you have

FADE THEORY: DIAGRAM 1



FADE SEQUENCE: DIAGRAM 2

COLOUR	BLACK	D'GREY	M'GREY	L'GREY	WHITE	YELLOW
DECIMAL	0	11	12	15	1	7
HEX	$00	$0B	$1C	$0F	$01	$07

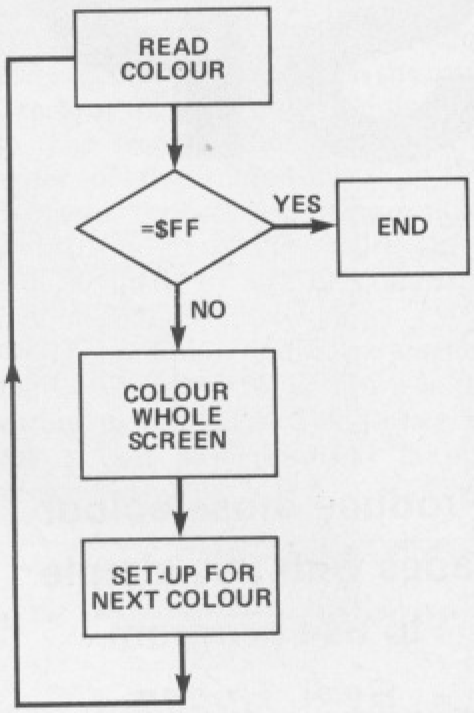
to do is load FADER.MC and then poke the values for your sequence into location $C035 (49205) onwards, terminating the sequence with $FF (255). Now all you have to do is print the text you want to be faded onto the screen in the SAME colour as the background. E.g. if you are fading the text in from a black background, then print the text onto the screen in black. It is then only a matter of typing SYS49152 and hey presto!

If you want to see this in action, then type in FADER DEMO and run it. Note, you must have FADER.MC on the tape or disk first. I have preset the demo to do the fade in as in the example I have just given. Now that you know how to fade-in, you can fade-out simply by reversing the sequence.

This fade technique can be applied to sprites and high resolution screens. Hopefully you should be able to develop your own programs to do this. An example of doing a fade with sprites is given in the program SPRITE FADE.

On a final note, you should have no problems typing in the programs as they are all in Basic. Also for those of you interested, I have given a rough flow diagram for FADER.MC which is shown in diagram 3. So there you have everything you need and hopefully you should be able to put this excellent technique to good use in our own programs.

DIAGRAM 3.



TAPE USERS WILL HAVE TO ALTER ALL THE ,8s to ,1s.

PROGRAM:FADER DEMO

```
57  10 A=A+1
EE  20 IFA=1THENLOAD"FADER.MC",8
    ,1
B3  30 PRINT"[CLR,BLACK]":POKES3
    280,0:POKES3281,0
28  40 PRINT"[SU,S*38,SI]";
8D  50 PRINT"[S-,SPC6]FADER (C)
    1989 RAYMOND HOBEN[SPC4,S-]"
    ;
03  60 PRINT"[S-,SPC11]FOR YOUR
    COMMODORE[SPC9,S-]";
BA  70 PRINT"[CQ,S*38,CW]";
77  80 FORT=0TO16:PRINT"[S-,SN,S
    M,SN,SM,SN,SM,SN,SM,SN,SM,SN
    ,SM,SN,SM,SN,SM,SN,SM,SN,SM,
    SN,SM,SN,SM,SN,SM,SN,SM,SN,S
    M,SN,SM,SN,SM,SN,SM,SN,SM,S-
    ]";
2C  90 NEXTT
3D  100 PRINT"[SJ,S*38,SK]";
6E  101 PRINTTAB(10)"HIT SPACE T
    O FADE";
AD  110 SYS49152
85  120 POKE49205,1:POKE49206,15
    :POKE49207,12:POKE49208,12:P
    OKE49209,0:POKE49210,255
B6  140 GETA$:IFA$=""THEN140
01  150 SYS49152:PRINT"[CLR,WHIT
    E]";
```

PROGRAM:FADER LOADER

```
E9  0 POKES3280,0:POKES3281,0
32  10 I=49152
DC  20 READ A:IF A=256 THEN GOTO
    50000
57  30 POKE I,A:I=I+1:GOTO 20
08  49152 DATA 166,254,189,53,19
    2,201,255,240
EF  49160 DATA 8,32,22,192,230,2
    54,76,0
47  49168 DATA 192,162,0,134,254
    ,96,160,0
3F  49176 DATA 153,0,216,153,0,2
    17,153,0
40  49184 DATA 218,153,248,218,1
    36,208,241,160
D5  49192 DATA 20,162,255,234,23
    4,234,202,208
5B  49200 DATA 250,136,208,247,9
    6,0,11,12
65  49208 DATA 15,1,7,255,0,0,0,
    0
7C  49216 DATA 0,0,0,0,0,0,0,256
DF  50000 PRINT"[CLR,WHITE,SPC6]
    HIT SPACE TO SAVE FADER"
13  50001 GETA$:IFA$=" "THEN5000
    3
52  50002 GOTO50001
B8  50003 POKE43,0:POKE44,192:PO
    KE45,71:POKE46,192
8D  50004 SAVE"FADER.MC",8
98  50005 END
```

PROGRAM:SPRITE FADE

```
BA  0 GOTO10000
50  10 POKES3280,0:POKES3281,0:P
    RINT"[CLR,WHITE]"
9B  20 REM
CE  30 FORT=2040TO2047:POKET,160
    :NEXT
98  40 POKES3269,255
22  50 FORT=0TO240STEP40
04  60 POKES3248,50:POKES3249,60
63  70 POKES3250,70:POKES3251,90
31  80 POKES3252,90:POKES3253,12
    0
E5  90 POKES3254,110:POKES3255,1
    50
00  100 POKES3256,130:POKES3257,
    180
94  110 POKES3258,150:POKES3259,
    210
FF  120 POKES3260,230:POKES3261,
    210
45  130 A=0:GOSUB300
5E  140 PRINT"[CLR,WHITE,SPC7]HI
    T SPACE TO FADE IN
46  145 GETA$:IFA$=""THEN145
AE  150 A=12:GOSUB300
4F  160 A=13:GOSUB300
BB  170 A=15:GOSUB300
D0  180 A=1:GOSUB300
E0  190 A=7:GOSUB300
43  200 GOTO20
E6  300 FORT=53287TO53294:POKET,
    A:NEXTT
23  310 FORD=0TO70:NEXTD
CF  320 RETURN
07  10000 I=10240
7D  10010 READ A:IF A=256 THEN G
    OTO10
DA  10020 POKE I,A:I=I+1:GOTO 10
    010
5E  10030 DATA 0,0,0,240,247,255
    ,240,247
32  10040 DATA 255,240,247,255,2
    40,247,255,240
90  10050 DATA 247,128,240,247,1
    28,240,247,128
A7  10060 DATA 240,247,128,240,2
    47,128,255,247
8B  10070 DATA 128,127,231,128,6
    3,199,128,31
CA  10080 DATA 135,128,15,7,128,
    15,7,128
D4  10090 DATA 15,7,128,15,7,255
    ,15,7
57  10100 DATA 255,15,7,255,15,7
    ,255,256
```

Strung Along

Understand the use of strings with this clear, concise explanation

By E. Dumbill

It is common knowledge that CBM64 Basic is far from easy to use at the best of times. This problem may have put many people off trying to program for themselves. One of the main inadequacies in the language is the functions designed to handle string variables, that is, LEFT$, RIGHT$ and MID$. I will describe the use of these functions in detail later. Basically, they allow the programmer to extract 'chunks' from string variables to manipulate within the program. Very well, you say, so what is wrong with that? Well, the problem is that while you can use LEFT$ etc. to extract bits from strings, see figure 1, you are not allowed to surgically change parts of a string, see figure 2.

Figure 1

A$="ABC"
PRINT LEFT$ (A$,2)
the result would be: AB

Figure 2
A$="ABC"

Now, supposing you wanted to change the 'AB' to 'DE' you might type:
LEFT$(A$,2)="DE"
the result would be: ?syntax error

As you can see, the computer will let you see what is there, but you are not permitted to change it. Many other forms of Basic do allow this function. Wouldn't it be nice if, just like using DEF FN in arithemetic, we could define functions to allow us to alter strings?. But, you have guessed it, C64 Basic will not allow it. I thought that this was inconvenient to say the least, and so I produced a series of subroutines which would allow me to alter my strings.

I will start at the beginning and describe to you how each function works, and how the surgical version of it works.

LEFT$

This function lets you take the leftmost characters from a string. The syntax is: **LEFT$** (*string$, elements*), where *elements* = the amount of characters you wish to extract. This number can obviously not be greater than the number of characters in the string.

RIGHT$

This function is very similar to **LEFT$**, in that it takes the rightmost characters from the string. The syntax is identical to that of **LEFT$**.

MID$

This function allows you to take characters from the MIDdle of a string, starting at the character that you specify. It is a very useful function and has many applications. For example, searching through a string to find a key character (perhaps ','). The syntax is: **MID$** (*string$, start, elements*) where *start* is the start character and *elements* is the amount of characters you wish to extract. *Figure 3* shows a very simple example.

Figure 3

```
A$="ABCDE"
PRINT MID$(A$,2,3)
the result would be: BCD
```

Now you know how to use the main functions, we can use these functions to help us define routines to alter strings at our leisure. Let's start with **LEFT$**. If we are altering the **LEFT$** part of a string, we are obviously leaving alone the **RIGHT$** part of the string. With this in mind, we can say that:

altered STRING$=NEW BIT$+RIGHT$ (OLD STRING$,X)

But, we do not know how many characters to change in the **LEFT$**, and consequently, how many **RIGHT$** characters (represented by x) to put on the end of the altered string to make it complete. For this, we need to use another function: **LEN**. This returns the number of characters in a string, referring to *Figure 3* the instruction:

PRINT LEN (A$)
would result in 5

If we can call the number of characters we want to leave intact is **LEN** (*STRING$*) minus **N**. We can put this into our program using **LEFT$** surgery:

altered STRING$=NEW BIT$+RIGHT$ (OLD STRING$,N)

But, it is a pain to have to state both the NEW BIT$, so we obviously need to use our friend LEN, and define N as LEN (NEW BIT$). So, our revised program looks like this:

ALTERED STRING$=NEW BIT$+RIGHT$ (OLD STRING$, (LEN (OLD STRING$)–LEN (NEW BIT$)

Complicated isn't it? No, not really! Here is a breakdown of the ugly looking **RIGHT$** function I used. What it does is to take the original string, and to chop off the **LEFT$** that is to be replaced by **NEW BIT$**. The length of the bit remaining intact (the **RIGHT$**) is given by subtracting the length of the changed bit (**NEW BIT$**) from the length of the original string.

Whew!

Now that we have struggled through that, we can actually do something with it, and write a routine to use in our programs.

Here is a simple example of the routine and how to call it:

```
100 L$=RIGHT$ (L$,LEN(L$)-LEN(N$)
110 RETURN
200 L$="CAT SAT ON THE MAT"
210 N$="DAN": GOSUB100
```

If you now run with **GOTO200**, then type **PRINT L$**, hey presto!, the string **L$** will have changed to **DAN SAT ON THE MAT.** Just a few notes about the routine: You will always have to use **L$** and **N$** for the strings to be specified, as there is no way of creating a new function. What we are doing is making a program that uses global variables, and there is no way of making values of variables stay *ONLY* inside the routine (LOCAL) as there is in other basics. That is the major limitation of the routine. So if, for example, you are using the variable **W$**, and wished to alter it, you would need to make **L$=W$** before calling the routine, and **W$=L$** after calling the routine. For this reason, you may find it more convenient to include line 100 as part of the main program, instead of using it as part of the subroutine. This too has its disadvantages, such as getting a sore finger from repeatedly typing brackets!

The subroutine for a surgical **RIGHT$** is obviously going to be much the same, but we must exchange the **RIGHT$** in the routine for a **LEFT$**, as it will be the **LEFT$** that we will now want to leave intact!

Here is the routine for a surgical RIGHT$

```
100 L$=LEFT$(L$,LEN(L$)-LEN(N$))+N$
110 RETURN
```

The use of this routine is much the same as the one above. How simple you cry! Doesn't it look easy? Well, yes it does, but then we discover a stumbling block in the form of **MID$**. However, with a bit of logical thought we can overcome it.

Just as a string is composed of **LEFT$** and **RIGHT$**, it is also composed of **LEFT$**, **MID$** and **RIGHT$**. Therefore, we now get:

```
ALTERED STRING$=LEFT$(OLD$,X)+NEW BIT$+RIGHT$(OLD$,X)
```

As with **MID$**, we can't get away with 2 parameters, **N$** and **L$**, but we need a third, **S**, which is the character at which the **NEW$** will start being inserted.

From that **S**, we can calculate all the information that we may need:

number of characters in LEFT$=S
number of characters in RIGHT$=LEN(L$)-S-LEN(N$)

so the program for **MID$** surgery looks like this:

```
100
L$=LEFT$(L$,S)+N$+RIGHT$(L$,LEN(L$)-S-LEN (N$))
110 RETURN
```

Use is as for the routines using **LEFT$** and **RIGHT$**, but with the extra inclusion of **S**, the start character for the insertion of **N$**.

I hope that you have enjoyed and understood this approach to constructing program routines to the end of making your own functions. Also, I hope that you can appreciate the power that a little thought adds to the humble C64 Basic.

Keep stringing!

EXTENDING BASIC PART 8

Add an auto line numbering facility to your collection of extended Basic routines

By Burghard-Henry Lehmann

When you enter a Basic textfile, the one thing which is fairly regular is the line numbers. Since computers are very good at doing regular, monotonous tasks, it makes sense to let the computer do the line numbering. All you have to do then, is worry about designing your program!

Automatic line numbering is pretty easy. All we have to do is intercept the flow of Basic in the ROM after a line has been entered into the textfile, or before a new line is started off – whichever way you want to look at it. For this let me elaborate on how Commodore Basic deals with a newly entered line.

Basic Warm Start

The whole process starts at $A483, the so called *Basic Warm Start* routine. This is the central point to which Basic loops back each time a line has been entered into the textfile or a direct command has been executed.

This point is so important, that it has been vectored by those clever Commodore ROM designers. That is, instead of jumping straight to $A483, the computer fetches the address it has to jump to from the vector at $0302. Under normal circumstances this location which lies in RAM and can be changed by the programmer, contains $A483 – the *Basic Warm Start* routine.

This will be the point where we will intercept Basic to introduce our auto line numbering routine. More about this in a minute.

At the beginning of the *Warm Start routine*, the computer goes into a loop which waits for the user to enter a character on the keyboard. This character, which can be anything at this point, is stored in a location, called the input buffer ($0200). Next the computer waits for the user to enter another character, this is stored in the following location in the input buffer, and so on until the user presses the return key (ASCII 13). This finishes this loop and terminates the characters in the input buffer with a zero.

Now, the computer finds out, if the line entered has a line number in front of it or not. If it hasn't got a line number, the "statement", as it is called, is interpreted and executed immediately as a direct command.

If the line starts with a line number, the keywords in the line are converted into tokens and then the computer looks if a line with the same line number is already present in the textfile.

If a line with that line number exists already, the old line is deleted.

Finally, the new line is inserted into the textfile.

If the line has nothing after the line number, nothing is inserted into the textfile, thus if this line already exists it will be deleted.

Auto Line Numbering

To introduce auto line numbering we first need a new command which starts it off.

I have chosen to use the standard extended command **AUTO**. Note, when testing for **AUTO**, the last two letters of the command will be tokenized by the computer into $A4, since **TO** is a Commodore Basic function.

To produce line numbers automatically we need to know two things:
Which line number does the user want to start automatic line numbering
What step or increment does he want the line numbers to use.

AUTO therefore needs two parameters:
The line number to start with;
The increment up to the next line number.

Both parameters should be separated with a comma. I haven't bothered to build in any error checks. If you want to be perfect, you should know by now how to foolproof something like this and force the computer to give a syntax error report.

The auto routine itself starts by collecting these two parameters and saving them into the zero page locations 251/252 (first line number) and 253/254 (step) (lines 1640-1780).

Next we change the Warm Start vector so that it points at our routine, instead of the usual routine in the ROM (lines 1820-1850).

Now we print a carriage return, which puts the cursor onto the beginning of the next line (lines 1890-1900).

Now we are all set to do auto line numbering.

The overall mechanics of auto line numbering is as follows: The current line number, contained in 251/252 is printed on the screen (lines 1990-2040). Then it is copied into the beginning of the input buffer (lines 2080-2130).

To print the number on screen we use the normal ROM routine $BDCD, which prints any number whose low byte is in X and whose high byte is in the accumulator. So that the routine can print the number onto the screen, it naturally has to convert it into ASCII digits. It does this and stores the ASCII digits at location $0100, terminated with a zero.

The reason why I explain all this is, that we make use of this fact when we have to move the line number (in ASCII digits!) into the input buffer (lines 2080-2130).

Now the computer enters the usual loop in ROM, which I have explained above, and which waits for the user to enter a full line (line 2170). In this routine the X-register is used for the index to the input buffer. Normally the loop starts with X=0, but since we have already entered a line numer into the input buffer, X contains whatever number of digits the line number consists of. We have the correct amount in X from the loop which we used earlier on to move the ASCII digits from location £0100 into the input buffer.

After this, we test for direct or line numbered statement (lines 2210-2280). This is a little superflous here, since there is no question about a direct statement being given at this point.

Line 2390 calls a routine in ROM which converts the line number at the beginning of the input buffer from ASCII into the more useful low byte/ high byte sequence and stores the result in zero page $14/15. This is used later to search the textfile to see if the line number already exists.

Now all Basic keywords in the line are tokenized (line 2440).

Then the computer searches through the textfile to see if a line with this number already exists (line 2450). If it does, the line is deleted (line 2500).

In lines 2540-2600 we calculate the next line number by adding the step contained in 253/254 to the previous line number contained in 251/252.

Then there are two further ROM routines (lines 2650 and 2660) which re-organize the Basic textfile and reset all the necessary pointers.

In lines 2710-2720 comes an important test which sees if there is something after the line number.

Most of the previous code I have copied straight from the ROM. Why this seemingly unneccessary duplication of code, you may ask?

Well, as I have already pointed out, it would be pretty annoying if we couldn't switch auto line numbering off sine while auto line numbering is on you can't give a direct command. Furthermore, the vectors at $0300 to $0332

```
10                 ORG 49152
20                 ENT
30      ;
40      CHARGET    EQU $0073
50      EXECVECT   EQU $0308
60      WARMVECT   EQU $0302
70      PRINT      EQU $E716
80      PRINTNO    EQU $BDCD
90      PRINTSTR   EQU $AB1E
100     PRINTCR    EQU $AAD7
110     PLOT       EQU $FFF0
120     ;
130     ;
140     ;
150     ;TURN EXTENDED BASIC ON
160     ;BY CHANGING VECTOR AT $0308
170     ;
180     EXTBASON   LDA #<PRGSTART
190                STA <EXECVECT
200                LDA #>PRGSTART
210                STA >EXECVECT
220     ;
230                RTS
240     ;
250     ;
260     ;
270     ;TURN EXTENDED BASIC OFF
280     ;BY CHANGING VECTOR AT $0308
290     ;BACK TO NORMAL ($A7E4)
300     ;
310     EXTBASOFF  LDA #<$A7E4
320                STA <EXECVECT
330                LDA #>$A7E4
340                STA >EXECVECT
350     ;
360                RTS
370     ;
380     ;
390     ;
400     ;*** MAIN PROGRAM ENTRY ***
410     ;
420     ;LOOK FOR EXTENDED BASIC COMMANDS
430     ;
440     PRGSTART   JSR CHARGET
450                JSR EXECSTM
460                JMP $A7AE
470     ;
480     ;IF BASIC TOKEN, GO NORMAL.
490     ;
500     EXECSTM    CMP #128
510                BCS NORMAL1
520     ;
530     ;SAVE $7A/7B.
540     ;
550                LDY <$7A
560                STY <251
570                LDY >$7A
580                STY >251
590     ;
600                CMP 'O
610                BNE NEXT
620                JMP OFF.RT
630     ;
640     NEXT       CMP 'C
650                BNE NEXT1
660                JSR CHARGET
670                CMP 'O
680                BNE NEXT1
690                JSR CHARGET
700                CMP 'L
710                BNE NEXT1
720                JSR CHARGET
730                CMP #$B0     ;'OR' TOKEN
740                BEQ COLOR.RT
750     ;
760     NEXT1      CMP 'A
770                BNE NORMAL
780                JSR CHARGET
790                CMP 'U
800                BNE NORMAL
810                JSR CHARGET
820                CMP #$A4     ;'TO' TOKEN
830                BEQ AUTO.RT
840     ;
850     ;
860     ;
870     ;DO NORMAL ROM-ROUTINE.
880     ;
890     NORMAL     LDA <251
900                STA <$7A
910                LDA >251
920                STA >$7A
930     ;
940     NORMAL1    JMP $A7ED
950     ;
960     ;
970     ;
980     ;
990     ;EXECUTE 'COLOR' COMMAND:
1000    ;
1010    ;GET INK PARAMETER.
1020    ;
1030    COLOR.RT   JSR CHARGET
1040               JSR $AD8A
1050               JSR $B7F7
1060    ;
1070    ;CHANGE INK COLOUR.
1080    ;
1090               STY 646
1100    ;
```

are not changed back to normal, even when you ress the run/stop restore keys! So, we have to take care of this ourselves.

It makes sense to switch auto line numbering off, when the user enters nothing but the line number.

In this case our routine jumps to the aptly called routine *NOTHING*, which resets the Warm Start vector back to normal (lines 2810-2840) and then jumps to the normal warm start in Rom (line 2880).

By now you should understand how you go about patching in new commands to Commodore Basic and should be readv to write some of your own. Watch out for more from me in a future installment of *Extending Basic*.

```
1110 ;GET PAPER PARAMETER.
1120 ;
1130           JSR CHARGET
1140           JSR $AD8A
1150           JSR $B7F7
1160 ;
1170 ;CHANGE PAPER COLOUR.
1180 ;
1190           STY 53281
1200 ;
1210 ;GET BORDER PARAMETER.
1220 ;
1230           JSR CHARGET
1240           JSR $AD8A
1250           JSR $B7F7
1260 ;
1270 ;CHANGE BORDER COLOUR.
1280 ;
1290           STY 53280
1300 ;
1310 ;JUMP TO REST OF ROM-ROUTINE.
1320 ;
1330           RTS
1340 ;
1350 ;
1360 ;
1370 ;TEST FOR REST OF 'OFF'.
1380 ;
1390 OFF.RT    JSR CHARGET
1400           CMP 'F
1410           BEQ OFF.RT1
1420           JMP NORMAL
1430 OFF.RT1   JSR CHARGET
1440           CMP 'F
1450           BEQ OFF.RT2
1460           JMP NORMAL
1470 ;
1480 ;EXECUTE 'OFF' COMMAND.
1490 ;
1500 OFF.RT2   JSR EXTBASOFF
1510 ;
1520 ;GET NEXT CHARACTER AND
1530 ;JUMP TO REST OF ROM-ROUTINE.
1540 ;
1550           JSR CHARGET
1560           RTS
1570 ;
1580 ;
1590 ;
1600 ;***  START AUTO ROUTINE  ***
1610 ;
1620 ;GET START PARAMETER.
1630 ;
1640 AUTO.RT   JSR CHARGET
1650           JSR $AD8A
1660           JSR $B7F7
1670 ;
1680           STY 251
1690           STA 252
1700 ;
1710 ;GET STEP PARAMETER.
1720 ;
1730           JSR CHARGET
1740           JSR $AD8A
1750           JSR $B7F7
1760 ;
1770           STY 253
1780           STA 254
1790 ;
1800 ;CHANGE BASIC WARM START VECTOR.
1810 ;
1820           LDA #<NEXTLINE
1830           STA <WARMVECT
1840           LDA #>NEXTLINE
1850           STA >WARMVECT
1860 ;
1870 ;DO CARRIAGE RETURN.
1880 ;
1890           LDA #13
1900           JSR PRINT
1910 ;
1920 ;
1930 ;
1940 ;***  DO NEXT LINE NUMBER ***
1950 ;
1960 ;PRINT LINE NUMBER AND SPACE
1970 ;ON SCREEN.
1980 ;
1990 NEXTLINE  LDX 251
2000           LDA 252
2010           JSR PRINTNO
2020 ;
2030           LDA #32
2040           JSR PRINT
2050 ;
2060 ;MOVE LINE NO INTO INPUT BUFFER.
2070 ;
2080           LDX #0
2090 MOVELOOP  LDA $0100,X
2100           BEQ ALLMOVED
2110           STA $0200,X
2120           INX
2130           JMP MOVELOOP
2140 ;
2150 ;GET STATEMENT INTO INPUT BUFFER.
2160 ;
2170 ALLMOVED  JSR $A562
2180 ;
2190 ;SEE, IF NUMBERED OR DIRECT.
2200 ;
2210           STX $7A
2220           STY $7B
2230           JSR $0073
2240           TAX
2250           BEQ NEXTLINE
2260           LDX #$FF
2270           STX $3A
2280           BCC NUMBSTATM
2290 ;
2300 ;IF DIRECT STATEMENT, ENCODE IT
2310 ;AND GO EXECUTE IT.
2320 ;
2330           JSR $A579
2340           JMP $A7E1
2350 ;
2360 ;IF NUMBERED STATEMENT, GATHER
2370 ;LINE NUMBER IN $14/15
2380 ;
2390 NUMBSTATM JSR $A96B
2400 ;
2410 ;AND ENCODE KEYWORDS IN STATEM.
2420 ;
2430           JSR $A579
2440           STY $0B
2450           JSR $A613
2460           BCC INSERTLIN
2470 ;
2480 ;DELETE OLD STATEMENT.
2490 ;
2500           JMP $A4A9
2510 ;
2520 ;CALCULATE NEXT LINE NUMBER.
2530 ;
2540 INSERTLIN CLC
2550           LDA 251
2560           ADC 253
2570           STA 251
2580           LDA 252
2590           ADC 254
2600           STA 252
2610 ;
2620 ;RESET PROGRAM POINTERS AND
2630 ;RELINK BASIC LINES.
2640 ;
2650           JSR $A659
2660           JSR $A533
2670 ;
2680 ;IF FIRST BYTE OF LINE = NULL,
2690 ;DO NOT INSERT LINE.
2700 ;
2710           LDA $0200
2720           BEQ NOTHING
2730 ;
2740 ;INSERT LINE INTO TEXTFILE.
2750 ;
2760           JMP $A4F8
2770 ;
2780 ;IF NOTHING ON LINE, CHANGE WARM-
2790 ;START VECTOR BACK TO NORMAL.
2800 ;
2810 NOTHING   LDA #<$A483
2820           STA <WARMVECT
2830           LDA #>$A483
2840           STA >WARMVECT
2850 ;
2860 ;EXIT TO NORMAL WARM START.
2870 ;
2880           JMP $A480
```

PROGLOK

Stop prying eyes and itchy fingers with this handy program

By Zak Beck

This program enables you, having just written your latest masterpiece, to 'lock' the computer so that, say, the kids cannot spoil all your hard toils. Before leaving your computer, it simply requires that you press 'f1' and enter any 6-digit password. Before the computer will return back to the language (eg BASIC), the correct code must be entered. This idea has been used before on expensive utility cartridges – well now you have it at little if no cost!

How it all works

The program is written in machine code. Obviously, if it were written in Basic, it would not be compatible with your masterpiece. It resides below Basic, from $1300 to $14C1, in the application or cartridge program area. This means that Basic does not have to be moved about, but the program MAY clash with some cartridges which uses this area as a workspace.

When you first use the program, it sets up function key '1' to call itself, and then returns back to Basic. When you wish to 'lock' the computer, press 'f1'. The program first deactivates the restore key, prints up its title, and some prompts. It does this using a kernal call called 'PRIMM' – print message. This works as follows:

```
JSR primm
.byt "Message goes here",0
......
(rest of program follows.)
```

Having called PRIMM, the computer will print out everything that follows until it comes across a '0' byte. Then it jumps back to your subroutine. This useful message-printer resides at 65405, $FF7D.

Proglok, having printed its titles and prompts will then ask for any 6 character code. This is implemented by subroutine 'getcod', which inputs 6 characters, storing them in buffer 'buff'. Then the program stores the contents into the password storage space, 'pass'.

Next, prompts are printed (label 'rest'), to tell the user that the computer has been locked, and that to use it he has to enter a 6 character password. Using 'getcod', an attempt is entered into the buffer 'buff', and the contents of 'buff' are compared with the password 'pass'. If any discrepancies are found, the computer jumps back to 'rest'. Otherwise, the restore key is reactivated, and the computer returns to the language (eg BASIC).

Using the Program

Type in the program (see getting it all in). Next, type the following:

SYS4864 and press return

This will intialise function key 1 to read 'SYS4891' + chr$ (13) as the command 'KEY' will show.

Pressing 'f1' in direct mode will call up the program, executing a call to address 4891. You can now enter your keyword, using any of the keys on the keyboard, including Line Feed and those on the keypad at the right of the 128. I feel six characters provide a fairly secure code, who wants their computer to be Fort Knox?

The password having been entered, the computer is immune to the restore key, and can only be accessed by typing in your code. When you come to want to use the machine again, press any key and up will come a screen asking you to enter your code. Entering the right code will take you into BASIC, entering the wrong one will take you back to the press any key screen again.

Should you forget the code, there is a useful little trick to enable you to recover your program. Follow the below instructions carefully:-

1. Hold down the RUN/STOP key;
3. Press in the reset button whilst holding RUN/STOP;
3. When the computer powers up, you will be in the monitor. Release RUN/STOP now!
4. Type: X and press return.
5. You will be back in BASIC. Typeing LIST and pressing return *should* give you your program back.

Getting it in

The Basic loader is easy to use. Just type it all in very carefully, and save it to tape or disk. Then run it. If you've made a mistake, ?TYPING ERROR will appear. If everything is alright, you can save the code using the following BASIC line:

BSAVE "(filename)", B15, P4864 TO P5313

When you want to use the program next time, use:

BLOAD "(filename)"

SYS 4864

And then follow the instructions under 'Using the Program...'.

And that's it...

PROGRAM LOCK

```
1 REM ********************
2 REM * PROGLOK LOADER   *
3 REM *  ZAK BECK  89    *
4 REM ********************
5 IF PEEK(46)=28 THEN 9
6 PRINT"+QQQSORRY - THIS PROGRAM
 ONLY WORKS FOR THE"
7 PRINT"C128"
8 END
9 CK=0:FORI=4864 TO 5313:READ A:
CK=CK+A:NEXT
10 IF CK<>36782 THEN PRINT "?TYP
ING  ERROR":END
11 PRINT"ROUTINE INSTALLED OK!"
12 PRINT:END
13 DATA169,18,133,252,169,19,133
14 DATA253,169,252,162,1,172,26
15 DATA19,76,101,255,83,89,83
16 DATA52,56,57,49,13,8,169
17 DATA98,141,24,3,32,125,255
18 DATA14,147,208,210,207,199,45
19 DATA204,207,203,32,32,32,32
20 DATA32,218,65,75,32,194,69
21 DATA67,75,32,49,57,56,57
22 DATA13,0,32,125,255,17,17
23 DATA17,17,17,197,78,84,69
24 DATA82,32,65,78,89,32,54
25 DATA32,67,72,65,82,65,67
26 DATA84,69,82,32,67,79,68
27 DATA69,46,13,17,17,17,201
28 DATA84,32,87,73,76,76,32
29 DATA66,69,32,83,69,69,78
30 DATA32,79,78,32,83,67,82
31 DATA69,69,78,32,65,83,32
32 DATA89,79,85,32,84,89,80
33 DATA69,13,17,73,84,32,73
34 DATA78,46,32,198,79,76,76
35 DATA79,87,32,84,72,69,32
36 DATA80,82,79,77,80,84,83
37 DATA32,33,13,17,17,17,212
38 DATA89,80,69,32,89,79,85
39 DATA82,32,67,79,68,69,32
40 DATA78,79,87,32,62,46,46
41 DATA46,46,46,46,157,157,157
42 DATA157,157,157,0,32,121,20
43 DATA160,6,185,175,20,153,181
44 DATA20,136,208,247,32,125,255
45 DATA147,13,13,212,79,32,71
46 DATA65,73,78,32,65,67,67
47 DATA69,83,83,32,84,79,32
48 DATA84,72,73,83,32,77,65
49 DATA67,72,73,78,69,44,13
50 DATA17,70,79,76,76,79,87
51 DATA32,84,72,69,32,80,82
52 DATA79,77,80,84,83,46,13
53 DATA17,17,208,82,69,83,83
54 DATA32,65,78,89,32,75,69
55 DATA89,46,13,0,32,188,20
56 DATA169,0,32,125,255,147,17
57 DATA17,212,89,80,69,32,73
58 DATA78,32,84,72,69,32,54
59 DATA32,67,72,65,82,65,67
60 DATA84,69,82,32,67,79,68
61 DATA69,32,62,46,46,46,46
62 DATA46,46,157,157,157,157,157
63 DATA157,0,32,121,20,160,6
64 DATA185,175,20,217,181,20,208
65 DATA9,136,208,245,169,64,141
66 DATA24,3,96,76,221,19,32
67 DATA188,20,141,176,20,32,45
68 DATA199,32,188,20,141,177,20
69 DATA32,45,199,32,188,20,141
70 DATA178,20,32,45,199,32,188
71 DATA20,141,179,20,32,45,199
72 DATA32,188,20,141,180,20,32
73 DATA45,199,32,188,20,141,181
74 DATA20,32,45,199,96,0,0
75 DATA0,0,0,0,0,0,0
76 DATA0,0,0,32,228,255,240
77 DATA251,96,0,90,0,88,0
```


THE USER PORT

Explore the possibilities of this versatile user port

By R. Smedley

When Commodore created the user port, they did not intend it to be used purely for RS232 communications, but instead to form a link between the computer and the outside world.

Despite the fact that there are twenty four lines available from the user port, only ten are actually required to connect the C64 to the outside world: PB0-PB7, 5v, GND.

The 5v and Ground (GND) lines can usually be used to power anything which is connected to the C64, but you must be careful not to draw more than 100m amps because this will damage the computer.

The theory

You should already know that there are eight lines in the user port (called PB0-PB7) which are available for the use of the individual. However, to actually use these lines they must be set to either input our output (they are set to input on power up). Luckily, the Commodore operating system makes this an extremely simple process. At location 56579 there is a bit for each line. To set a line to input make the bit zero, to set a line to output the bit must be one. (ie if you set bit 3 to one then line PB3 will be set to output). The following example should make this easier to understand.

Bit No: 7 6 5 4 3 2 1 0
Value: 0 1 0 0 1 1 0 0

You can see that lines 6, 3 and 2 are going to be set to output, and lines 7, 5, 4, 1 and 0 set to input. To actually achieve this configuration, the binary number, next to the value, must be translated into decimal so that it can be entered into the computer, using the 'poke' statement. The necessary calculation is as follows:

2 to the power of 6 + 2 to the power of 3 + 2 to the power of 2.

In other words 64+8+4 which equals 76. Therefore, to achieve the configuration in the example we would have to **POKE 56579,76.**

Output

Now that the lines have been set, assuming some have been set to output, it becomes necessary to have a way of controlling the state of the lines (either low or high), which again is an extremely simple process. A bit has been allocated to each line at location 56577. To make a line go high you set it to zero (i.e. if you set bit 6 to 1 then line PB6 will be taken to be high). You must remember not to try and output through a line set to input because this will just confuse the C64.

The following example should make this clear:

Bit no:	7 6 5 4 3 2 1 0
Value	0 1 0 0 0 1 0 0

As you can see, lines 6 and 2 are required to go high, leaving the other lines low. Again, this binary figure must be translated into decimal. Using the same process as above we discover that the figure required is 68. Therefore the following statement must be entered:

```
PROGRAM: LISTING 1

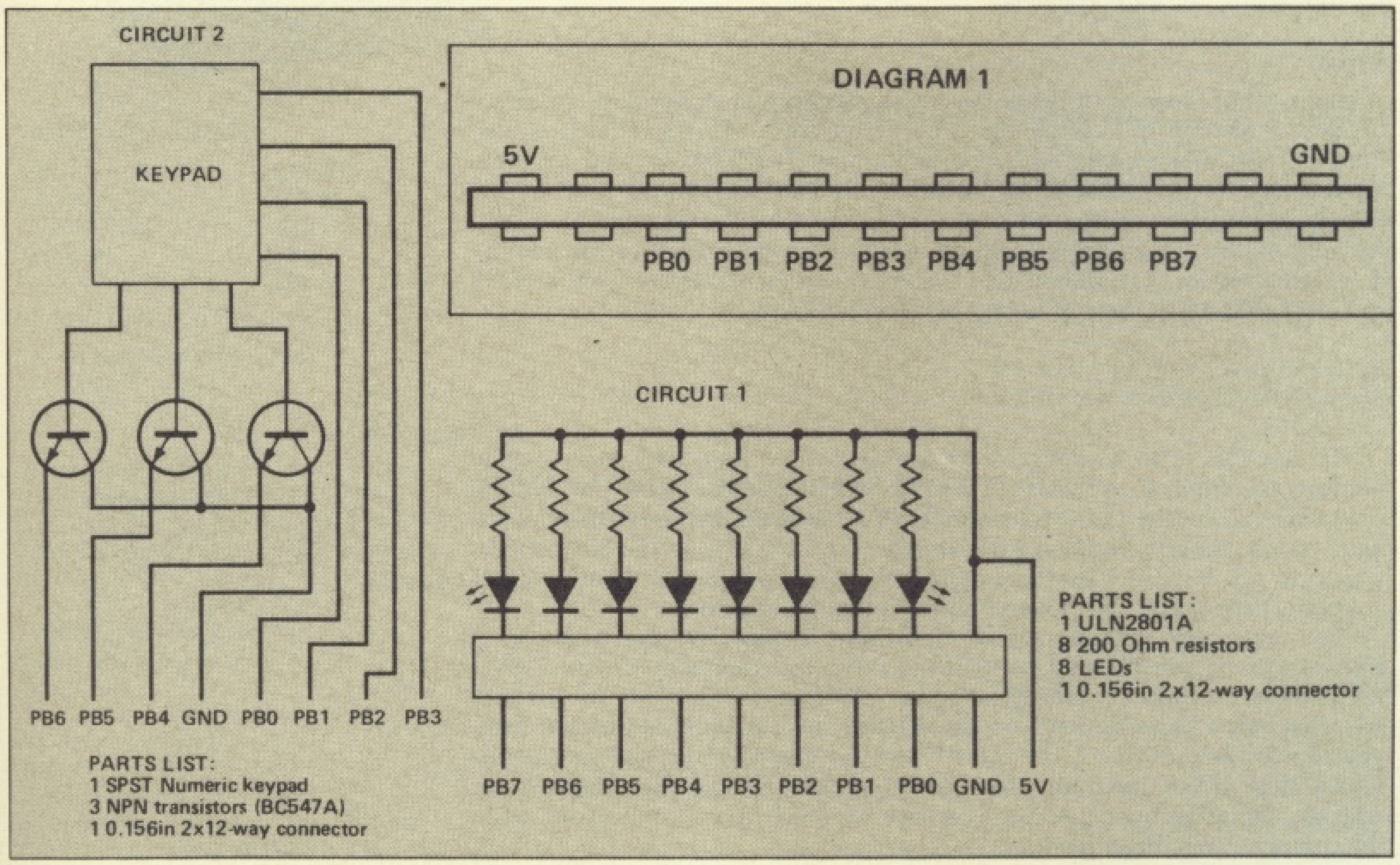
AF   10 REM*************
82   20 REM*LISTING 1* BY R.M.SME
     DLEY 1989
BB   30 REM*************
19   40 A(1)=1:FORB=2TO8:A(B)=A(B
     -1)*2:NEXT
91   50 A=50:B=0:C=-1
70   60 FORZ=ATOBSTEPC
52   70 FORI=8TO1STEP-1:POKE56577
     ,A(I)
E1   80 FORT=0TOZ:NEXTT,I
0F   90 FORI=1TO8:POKE56577,A(I)
7A   100 FORT=0TOZ:NEXTT,I,Z
C4   110 IFA=0ANDB=50THENPOKE5657
     7,0:END
09   120 A=0:B=50:C=1:GOTO60
```

```
PROGRAM: LISTING 2

AF   10 REM*************
49   20 REM*LISTING 2* BY R.M.SME
     DLEY 1989
BB   30 REM*************
B6   40 D=PEEK(56577):D1=D
C4   50 C=256:FORA=8TO1STEP-1
47   60 C=C/2:IFINT(D/C)=1THENB$=
     B$+"1":D=D-C:NEXT
1D   70 IFA=0THENGOTO90
B4   80 B$=B$+"0":NEXT
71   90 PRINTD1,B$:B$="":GOTO40
```

```
PROGRAM: LISTING 3

6C   1 REM*************
1A   2 REM*LISTING 3* BY R.M.SMED
     LEY 1989
```



```
86  3 REM************
93  10 FORI=49152TO49429:READA:P
    OKEI,A:NEXT:SYS49152
19  20 DATA120,169,84,141,20,3,1
    69,192,141
22  30 DATA21,3,88,169,0,141,3,2
    21,141,83
91  40 DATA192,76,66,192,147,17,
    32,32,75,69
8C  50 DATA89,80,65,68,32,83,79,
    70,84,87,65,82,69,32,86,49,3
    2,45,32,66,89,32,82,46
23  60 DATA77,46,32,83,77,69,68,
    76,69,89,141,17,0
56  70 DATA173,23,192,201,0,240,
    9,32,202,241,238,67,192,76,6
    6,192,96,0,173,1,221
64  80 DATA205,83,192,208,3,76,4
    9,234,141,83,192
33  90 DATA201,183,240,3,76,113,
    192,169,49,32,202,241,76,49,
    234
3D  100 DATA201,215,240,3,76,128
    ,192,169,50,32,202,241,76,49
    ,234
F9  110 DATA201,231,240,3,76,143
    ,192,169,51,32,202,241,76,49
    ,234
70  120 DATA201,187,240,3,76,158
    ,192,169,52,32,202,241,76,49
    ,234
FC  130 DATA201,219,240,3,76,173
    ,192,169,53,32,202,241,76,49
    ,234
75  140 DATA201,235,240,3,76,188
    ,192,169,54,32,202,241,76,49
    ,234
9E  150 DATA201,189,240,3,76,203
    ,192,169,55,32,202,241,76,49
    ,234
5A  160 DATA201,221,240,3,76,218
    ,192,169,56,32,202,241,76,49
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89  170 DATA201,237,240,3,76,233
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    ,234
21  180 DATA201,222,240,3,76,248
    ,192,169,48,32,202,241,76,49
    ,234
95  190 DATA201,190,240,3,76,7,1
    93,169,42,32,202,241,76,49,2
    34
B6  200 DATA201,238,240,3,76,49,
    234,169,35,32,202,241,76,49,
    234
```

POKE 56577, 68

To enable you to see for yourselves what effect the contents of location 56577 has on the state of the lines, you might like to construct *Circuit 1,* (refer to *Figure 1* for the pin configuration of the user port). The device consists of a ULN2801A ocatal darlington driver which amplifies the signal from the user port, to light the LEDs on the lines which have been taken high (before using the device you must enter **POKE 56579, 255** to set all the lines to output). In order to see the speed and accuracy at which the computer can control the lines, you might like to enter Listing 1. (As the program gains speed whilst it is running, you must remember that there is only ever 1 LED lit at a time, the reason for you seeing more than 1 is because the effect of the image lasts on your retina for approximatelay 1/10th of a second.)

Input

Assuming that some of the lines have been set to input, it becomes necessary to have a method of reading the state of the lines. As you already know, there is a bit allocated to each line at location 56577, so to read the lines all you have to do is PEEK this location, remembering that if some of the lines have been set to output then part of this figure will correspond to output. Because of this, and having to know which lines have been forced low by an external device, you will have to convert the original number from decimal to binary. The easiest way of doing this is shown below:

Bit Number:	7	6	5	4	3	2	1	0
Dec Value:	128	64	32	16	8	4	2	1

To use this table to convert decimal to binary, you take your decimal number and look at the chart. Take the largest number (from the bottom row) which is smaller than your number. You then simply repeat this process until your number is reduced to zero, when you put a 0 by the bit numbers which do not have a 1 by them. You now have your binary figure. Where you see a 1 the line is high, and a 0 shows a line which is low.

For my second example circuit, I thought it might be nice to come up with something which might be useful to other programmers. *Circuit 2* gives the necessary details to connect a numeric keypad to the C64. In order to see what effect pressing keys on the keypad has on the state of the lines, you should enter *Listing 2.* To actually use the keypad, enter and run *Listing 3* (An IRQ driven program which reads the keypad and then displays the relevant character on the screen, because of which it will only work when the computer is in direct mode).

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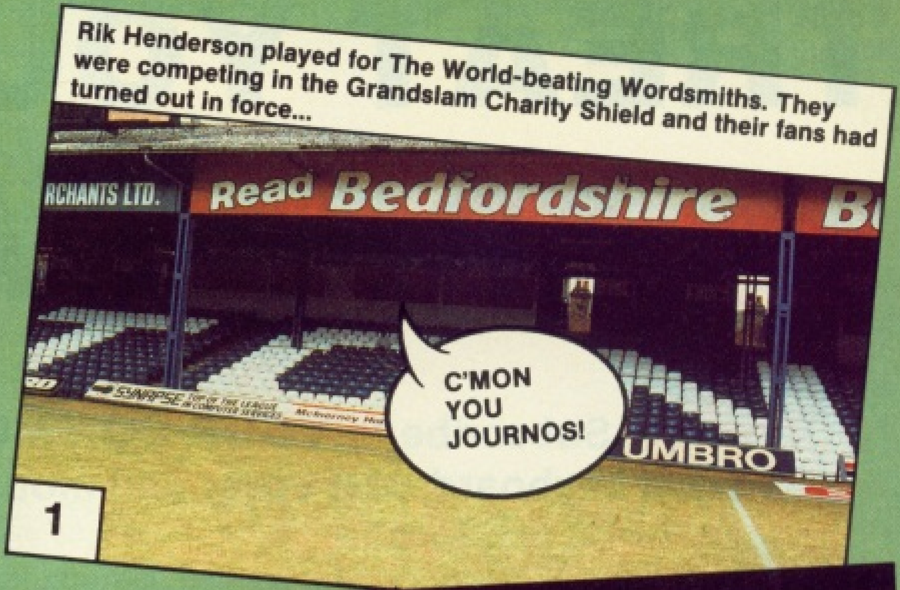
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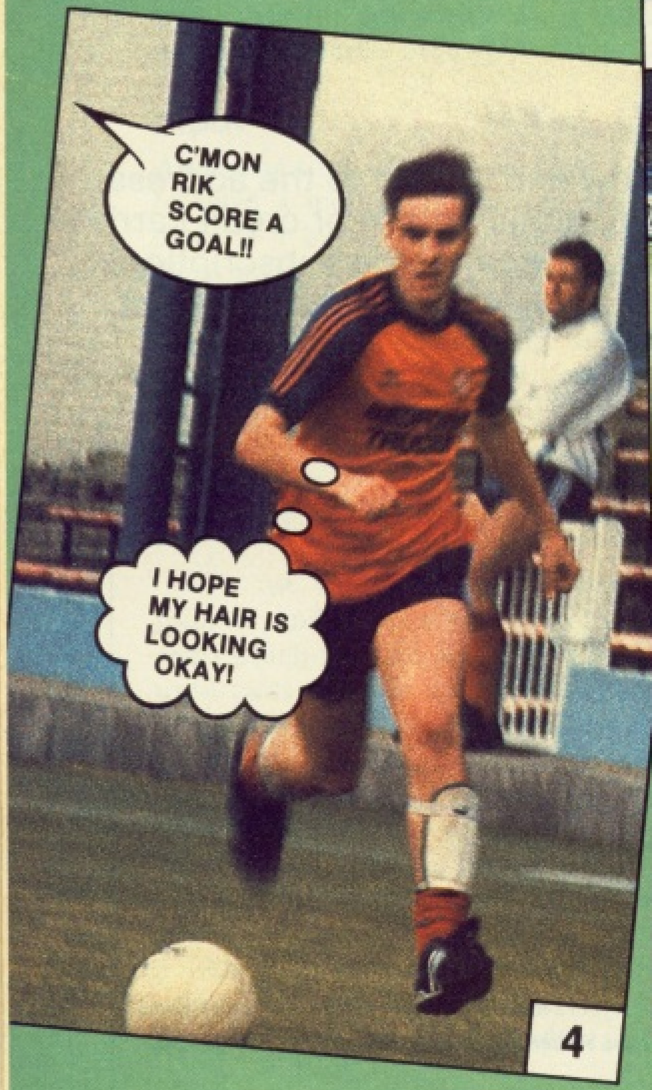
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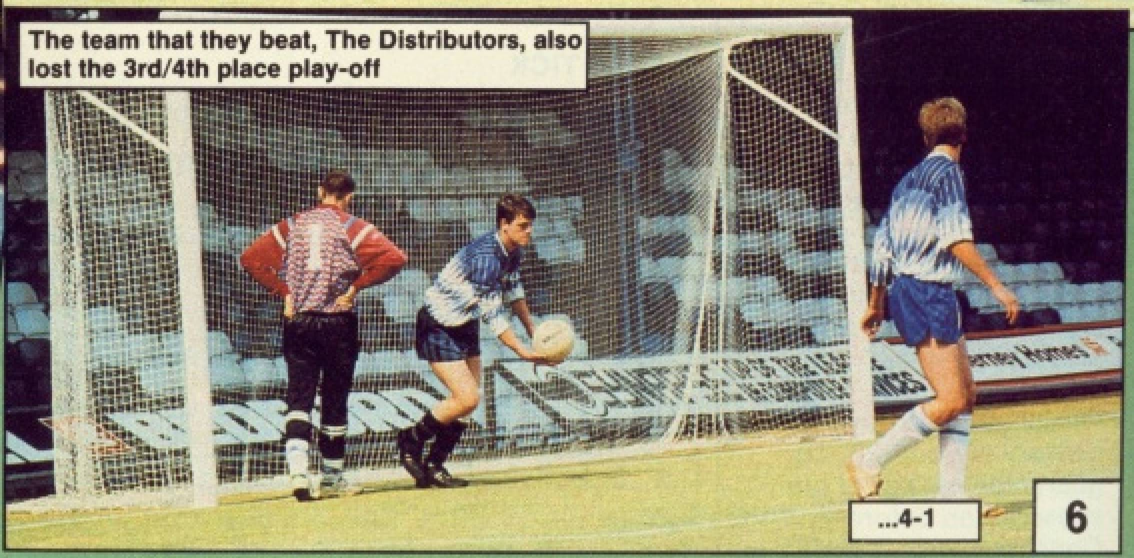








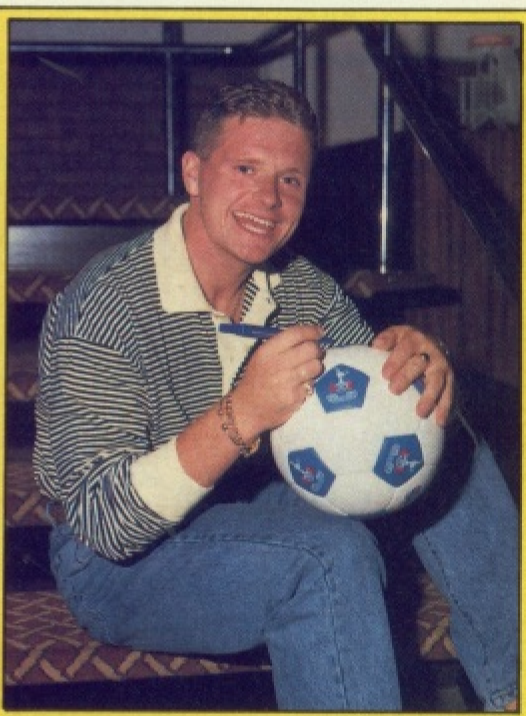






Photography: Frane Maroevic
Script: Rik Anonymous

GET SHIRTY!





You may ask what YC is doing to celebrate the new football season? Well we, coupled with those wobbly chappies (and chappesses) at Empire, are giving away a football and a Tottenham shirt. But hold onto your aluminium studs, these are no ordinary Spurs goodies. They're Spurs goodies signed by the Mars bar kid himself, Paul Gasgoigne.

To get your grubby mitts on the prizes (as modelled here by the delectable Maria Wade) you must answer the following three questions. To make it harder for you we insist that you do it whilst jogging on the spot.

1. From what team did Tottenham sign Paul Gasgoigne?
a) Newcastle United.
b) Melchester Rovers.
c) Washington Redskins.

2. When was the last time that Tottneham won the FA Cup?
a) When dinosaurs did rometh the Earth.
b) 1981-82
c) 1900-01.

3. How tall is our Gazza?
a) 5′ 10″
b) As tall as Blackpool tower.
c) 3′ 2″

Put the answers on the back of a postcard (or sealed envelope) and send them to.

Gazza Compo, YC, Argus House, Boundary Way, Hemel Hempstead, HP2 7ST.

The first correct card pulled out of the woolly hat on 15th November 1989 will grab the whatsits.

The Ever Important Big Wobbly Rules

Entries will not be accepted from employees of Argus Specialist Publications, or Empire. This restriction also applies to employees families, agents of the companies, and pieces of fruit.

The entry restrictions form part of the rules and the Editor's decision is final (you can be guaranteed that it will be a good one though!). No correspondence will be entered into. In the event of a flood, we reserve the right to use a hairdrier.

PS. No entries will be accepted if scribbled on the back of a cabinet minister.

IT'S A WOBBLER!



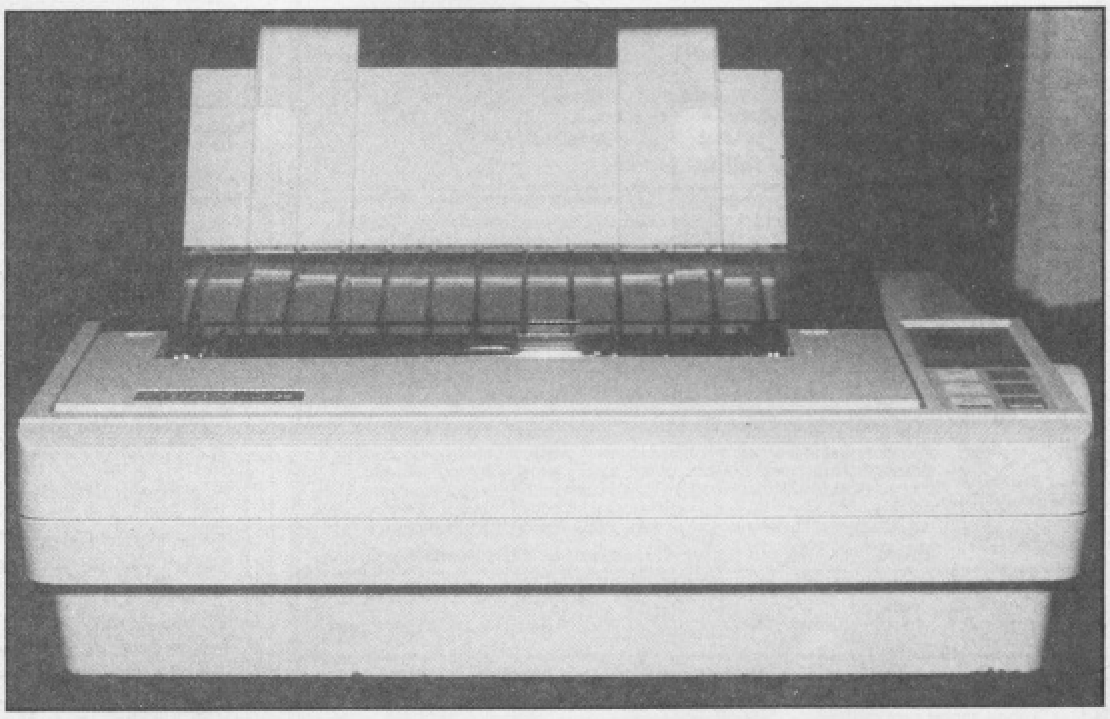
Y.C. SURE SHOT

Wobbling Y.C. Editor wobbles the frame work? At a charity penalty shoot out. After hitting the absolutely mega wobbler in to wobbling orbit he fell into an Epper-wobbling wobbler causing much concern! (they all went to lunch).

All the advertising team of Y.C. wish Rik an absolutely wobbling football career.

Could Duncan Evans be confucius? Not likely, but he has certain similarities, neither of them played full-back for Liverpool. He also runs his beadies over the new Swift 24-pin printer.

SWIFT AS A NEWT



Above: A rather decorative little number, don't you think?

Confucius he say, "Computer without printer is like Steve Ovett – it's all in the memory." Well I lie, he didn't really, I made that up. He would probably have had a printer though, I mean how else are you going to output your mind boggling philosophical doctrines unless you can get a hard copy. Oh, it was easy enough in Confucius' day, you just ordered the nearest monk to start scrawling on a slate and before you could say, "The analects of Confucius", you were five generations down the line and your life's work was being published posthumously.

Unfortunately there aren't that many monks willing to spend their lives scrawling out my reviews for *Your Commodore,* and alas, very few nuns either, so in order to support myself and my football team of starving children I needed the hi-tech equivalent. Citizen Europe also realised that monks were in short supply, and that they wrote as quickly as a Commodore Printer, and thus released the 120-D, a relatively cheap 9-pin printer. This combined low cost with decent performance and became the biggest selling 9-pin printer in Europe.

Fair enough, but what has that to do with the price of cheese you may ask, and quite rightly too. Well, good old Citizen, flushed by the success of the 120-D has launched something of a successor, the Swift 24, which it hopes will swamp the 24-pin market in a similar manner to the 120-D and the 9-pin market.

The Swift 24 offers the reasonably low price of £389 ex VAT and the power of a 24-pin printer, plus the convenience of no dip switches. Interested? Then read on.

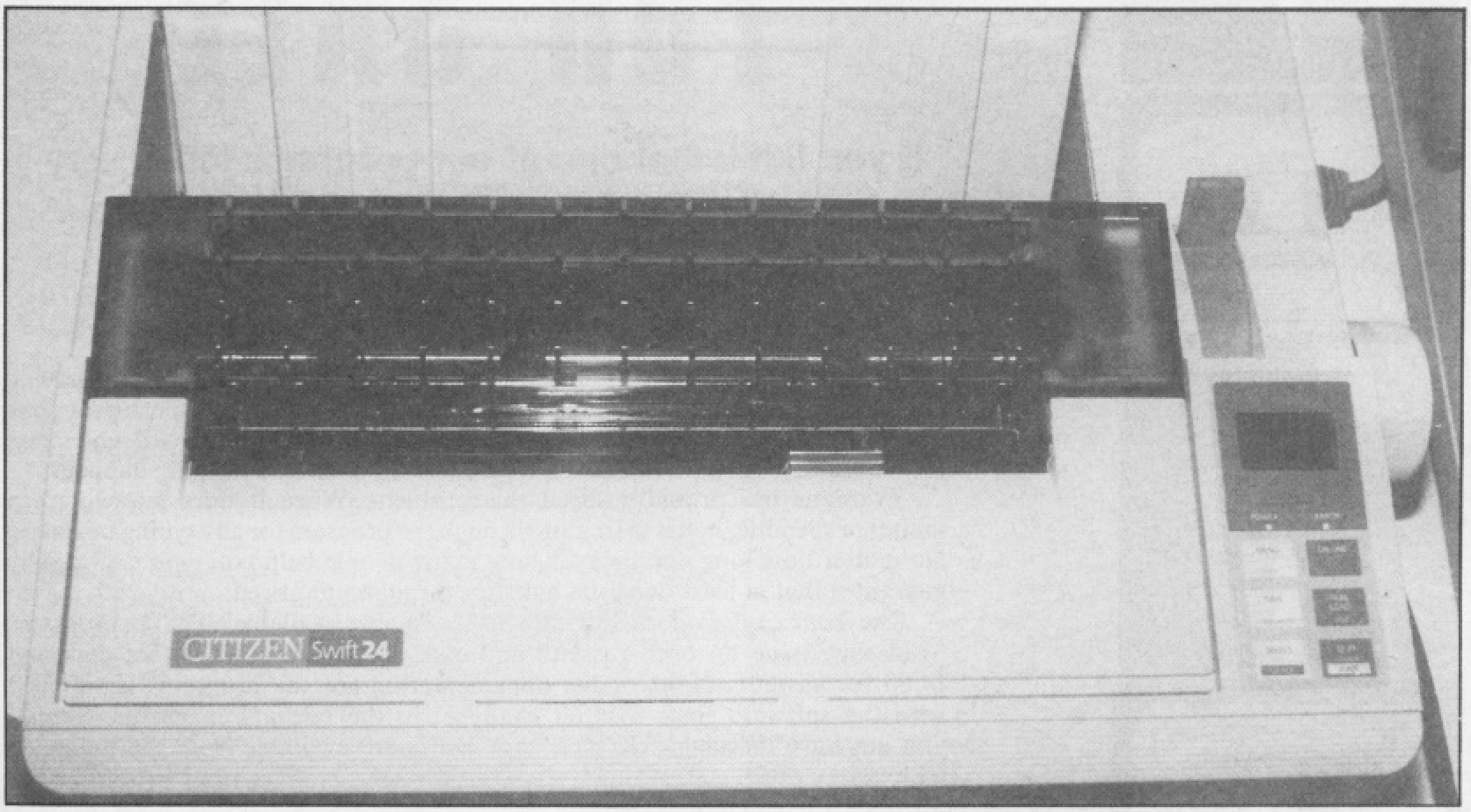
Amongst the many claims made for the Swift 24 by Citizen, is one of sturdiness. Okay, let's see I thought, and dropped it on the floor from a foot. Apart from the top flapping around like a fish in the sea outside Sellafield, the Swift was unperturbed by its flying lesson. But then again, who has their printed situated only a foot off the floor? I tried two feet, and was rewarded with an unidentifiable piece of plastic whizzing past my ear as the shock wave set alarm bells ringing all over North London. The printer wasn't too happy with this treatment, and had to be calmed down and reassembled before it was up to printing out this article. I still don't know where that piece of plastic came from.

The Swift has a two year warranty from Citizen, as long as they don't catch you dropping it on the floor, and the print head is guaranteed to give you 200 million dots before dying, while the rest of the moving internals will last approximately 4500 hours before ceasing to function. As long as you aren't rough with it, it should last five years with ease.

There's a tractor feed and an excellent single sheet paper feeder, and the printer is equipped with a Centronics parallel interface as standard wth a serial RS232C as an optional extra.

Printing speed is another great claim in the advertising blurb, but at only 192 characters per second (at 12cpi) in draft mode its performance is only average against 9-pin printers in this price range. That's the fastest it gets, you should also take into consideration 160 CPS (at 10cpi) in draft, and more

Below: The Swift 24, faster than a speeding paycheck!



importantly 53 CPS at 10cpi and 64 CPS at 12cpi in NLQ mode. The NLQ fonts are presumably why you want this printer, otherwise I assure you, you are wasting your money. An 8K buffer helps the printing process, and a snappy little display tells you how much of the buffer is full of incoming data.

The inbuilt fonts are Times Roman (okay), Courier (very good), Helvetica (sans serif and excellent) and Prestige Elite (horrible). There is a cut away section of the printer where optional font cards can be plugged in to extend the range, and of course your software may be able to create additional fonts anyway. The dot density is 120 DPI in draft mode, and 360 DIP for NLQ and graphics modes.

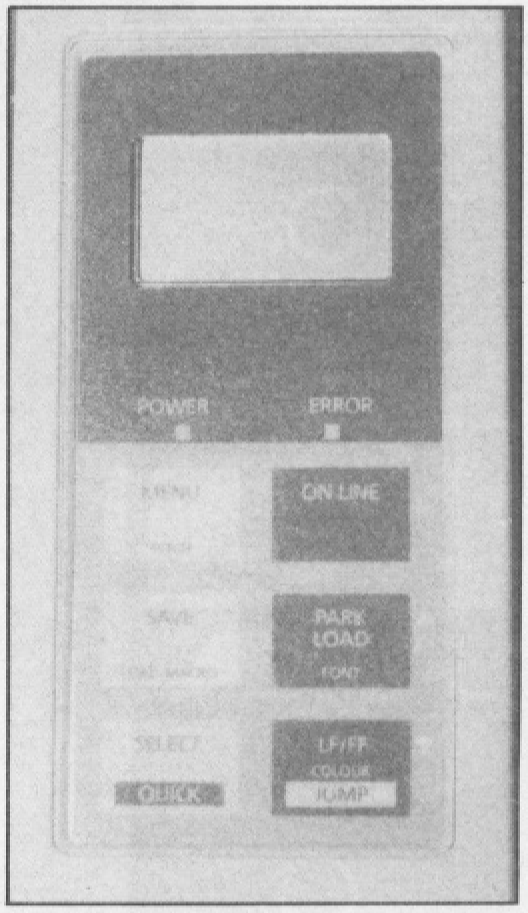
Instead of dip switches, the Swift has a two line, eight character LCD, and eight button keypad. This can be used to alter all sorts of printer functions including character set (from UK toJapan to Latin American), page layout (size and lines per inch), printer emulation (Epson LQ850, IBM Proprinter X24 and NEC P6+), font, colour or standard ribbon, pitch (proportional and up to 20CPI), and interface options.

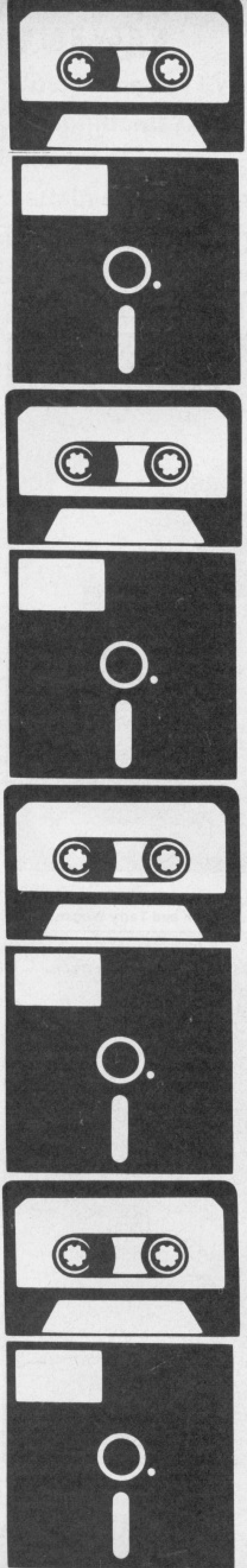
The control panel also allows you access to four macros, which contain predefined settings. You can redefine any of these and save them into the Swift's electronically eraseable programmable read only memory (EEPROM), so that when the printer is next switched on, your settings are automatically loaded as the default.

The Citizen Swift 24 is an excellent printer, offering the power of 24-pin printing, but with a low cost, considerable ease of use, a resilience to the sort of damage the average can inflict upon it, and it's backed up by a two year warranty. If Confucius was alive today, the Swift could have saved five generations of monk an awful lot of hard work.

Duncan Evans

Below: Don't press the button that says death, destruction and Terry Wogan.





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If you think that one of our programs looks very interesting, but you can't afford the time to type it in, then our software service will help you out

It's three o'clock in the morning. You sit at the computer keyboard having just finished a marathon typing session entering one of the superb programs from *Your Commodore*. Your fingers reach for the keyboard and press the letters R, U and N. You press RETURN, sit back and nothing happens.

Everyone has probably faced this problem. When it does happen it's a matter of spending hours searching through the program for any typing mistakes. No matter how long you look or how many people help you, you can usually guarantee that at least one little but slips through unnoticed.

The *Your Commodore* Software Service makes available all of the programs from each issue on both cassette and disk at a price of £6.00 for disk and £4.00 for cassette. None of the documentation for the programs is supplied with the software since it is all available in the relevant magazine. Should you not have the magazine then back issues are available from the following address:

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Please contact this address for prices and availability.

The Disk

Programs on the disk will also be supplied as totally working versions, i.e. when possible we will not use Basic Loaders thus making use of the programs much easier. Unfortunately at the moment we cannot duplicate C16 and Plus/4 cassettes, However programs for these machines will be available on the disk.

What programs are available?

At the top of each article you will find a strap containing the article type, C64 Program etc. So that you can see which programs are available on which format, you will also find a couple of symbols after this strap. The symbols have the following meaning:



This symbol means that the program is available on cassette.



These programs are available on disk.

Please Note

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AUGUST 1989

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EDITOR'S NOTE

Due to a production error in last month's *Your Commodore*, the review of **Challenge Software's Treble Champions** carried the wrong INFO Box. Unfortunately the scores presented did not give the game the justice that is deserved.

We on the Editorial team apologise to Challenge Software, and the readers who may have been confused and we feel that it is only right to print the correct INFO Box here.

INFO

Gameplay: 93%
Graphics: N/A%
Sonics: N/A%
Lastibility: 91%
Overall:
93%





"Treble Champions is possibly the most complete football strategy game to date..."

Christmas is coming – and that means the start of the coin-op avalanche in the shops. John Cook takes a look back at the arcade hits this year and wonders how the hell you fit a 4 Megabyte extravaganza into 512, let alone 64K!

NEON ZONE

If it's Christmas, it must be coin-ops, coin-ops and more coin-ops. Well, that's what all the major publishers decided a few years back anyway and as the punters have responded with wopping the wads of green stuff on counters all around the country, I guess they must have been right.

You can count the home format hits over the years — **Gauntlet, Outrun, Operation Wolf** — just three of the titles that took the elusive number one spot over the festive season on consecutive years, with a whole trail of others not far behind, all riding on the back of phemoninal arcade success.

Christmas '86, **Gauntlet**, the first four-player game ever in the arcades, '87 gave us **Outrun** the best and most glamerous driving game at the time and in '88 came **Op Wolf** the not particularly ideologically sound electronic shooting gallery that virtually caused a world shortage of 10p pieces.

If you are an afficionado of coin-ops, you'll notice that there's a significant time lag between a machine hitting the arcades themselves and appearing on home formats. The reason for this is pretty obvious. Coin-op manufacturers program and manufacture the games to an almost finished state (bear in mind the scale of the operations here — Sega alone have a workforce of 400 engineers working on the next **Afterburner**), they then offer the licence to program the game on home formats to the various software houses.

Decisions are made, deals — whereby obscenely large amounts of money change hands — are struck, and then the programming must begin. Yes, some poor son-of-a-bitch has now got to get down to the brass tacks of fitting some 4 Meg extravaganza into 512, 64...or if he's done something particularly nasty in a past life, 48K.

How the hell do you start doing that, you might ask yourself? Well, in some cases it's quite simple. You don't. Many of the present generation of games, particularly the Sega titles, work by throwing tonnes of hardware at the thing, pre-shifting loadsa sprites and just (just!) blatting them up on the screen very, very fast, And you can't do that on any affordable home machine available today. So what do you do?

Some conversion houses take the view that if you can't do it properly, you don't do it at all and turn such work down. Others, bear in mind that there is a fair bit of dosh being flung around for these jobs, not to mention possible prestige, set to work on cutting the original game down like a crazed plastic surgeon, so it can work on common home micros, after a fashion.

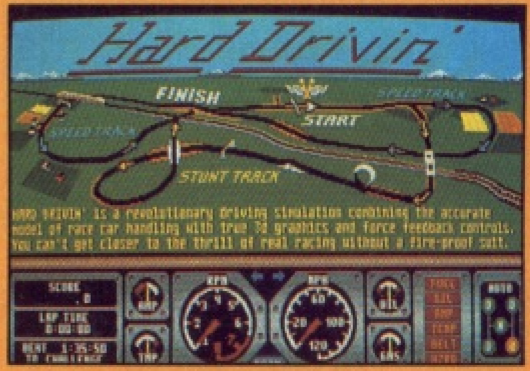
In the days when all that was in an arcade machine was a 6809 processor, 32K or memory and a sound chip, true coin-op conversions were possible. Now, the coin-op hardware has accellerated away into the distance, way out of reach of even the high end home machines, like the Amiga. What you get now are coin-op facimalies and anyone that thinks you get the same as the original deserves to get disappointed!

Maybe this is one of the reasons that coin-ops seem to be slightly less prevalent this year than previously. **Activision** are at it the same as ever though. Last year it was **Afterburner** and **R-Type** — this year it's **Altered Beast** and a very ambitious conversion of **Power Drift**.

Power Drift in particular is going to pose very, very significant problems, being a selection of blindingly fast sprite routines. Cut down the colours, take out the scenery, is it really going to be the same kind of experience as the original which was primarily designed to be a sit-in, throw you around, assault you with ear shattering decibels job? I think not, Brian.

How about **US Gold**, who must be piqued about failing to make the hat-trick with **Thunderblade** last time around? Only **Capcom** titles on release this year with a creditable version of **Strider** hitting the streets about now and **Gouls 'n Ghosts** coming in on the run up to December. There's a near perfect version of this on the Sega Mega-Drive console, so this is certainly a possible in the authenticity stakes, but the gameplay is a bit unspectacular and too similar to the original **Ghosts 'n Goblins** that did so well for **Elite** way back. But maybe the punters will be rushing back for more of the same.

Perhaps it's **Ocean** again who are in with the best strike at the top spot, as **Chase HQ** made a good enough impression in the arcades and, although challenging to write, is basically a driving game where you can bash into the opposition. Got to be a contender along with **Op Wolf** follow up, **Operation**



















Thunderbolt and **Cabal**.

But in the Dark Horse department, you have to consider **Domark** who'll be releasing on all formats the biggie, **Hard Drivin'**, from Atari Games. Now this title was the first coin-op to use filled polygon graphics (like **Carrier Command**) – not counting the weird **I-Robot** – and is a great game to boot. boot.

Due to some dodgy programming stateside, the coin-op hasn't got a startlingly fast frame rate and the 16 Bit version should come out about the same, with the 8-Bits suffering but still, probably acceptable...and in trendy 3-D too. That's my tip for the top for this Chrissy, for what it's worth. But what about next year...for now is the time that next years coin-op conversion hits start making their way into the arcades.

Driving games have, again, been making the arcade operators feel warm inside as the pennies drop noisily into the coin slots. The award for most technically advanced has to go to **Winning Run** from a company called **Namco**. Like **Hard Drivin'** this one is a filled poly game but with a difference. It's fast. Very, very fast with some heartbreakingly beautiful touches, such as fading the pallate of background objects up as they proceed towards you. Just like in real life.

It's a race game *par excellence* as well with smart and quick opposition plus car handling you'd normally dream about. In two modes of difficulty — hard and bloody impossible — there's plenty of life in the thing, so get yourself along to an arcade and try it out now and good luck to the guy that has to put it on home format.

Sega is probably the single most successful arcade company. Its "I've got a hardware expanded sprite routine and I'm going to use it" approach has spawned many hits, along with some sophisticated sit-in units. Its latest is also its best — **Super Monaco Grand Prix**.

SMGP is also a racing game — but with a different breed compared to something like **Winning Run.** If the latter were an elegant gymnast, **SMGP** would be Mike Tyson. The thing impresses by sheer power of volume and speed and is guaranteed to leave you breathless and wanting more! Can't see the software houses turning this one down.

Capcom has come up with a new hardware configuration called its CP System, based on a couple of super custom chips that were developed in-house.

This board can obviously do great things — **Strider** and the newer **Willow** and **Dynasty Wars** being three of them — but the feeling is that the best is yet to come.

In the beat em-up stakes, the sprites are becoming bigger and bigger — in game such as **Violence Fight** and **Data East's** fantasy combat bash, but nothing new beyond that.

After the success of **Op Wolf**, there have been many similarily inspired games, the white knuckled **Mechanised Attack** from SNK, Cabal and the latest, **Dynamite Duke**. The only surprising thing was that the official follow-up from **Tafto**, the two player **Operation Thunderbolt** was such flop. Overall, however, '89 has established that the common or garden hardware used in the everyday PCB games has vastly outstripped the capability of the most popular home computers.

A simple game such as **SNK's Prehistoric Isle** has so much going on, in so many colours, even that would be difficult to undertake. The pace of technological change — the one that spawned home computers and video games almost simultaneously — is so fast that in coin-op terms, the machine you bought last year, let alone five years ago, is now obsolete in arcade terms.

Which begs the question — if that is the case, what will we all be playing in two Christmas's time? And on what machines? Enter stage left a Commodore games console, maybe? Well, whatever, keep that joystick handy, Player One, and give those aliens hell! Until then, if you have been, ta very much...Kirk out.

COMMODORE Disk User

FOR C64 AND C128 USERS

Alright then! You've bought your C64 or C128, Disk Drive and maybe a Printer and Colour Monitor. So what are you going to do now?

Are you content to simply use all this expensive equipment to play the odd game, or, do you want more from your computer system? If the answer is YES then this is for you.

Commodore Disk User (CDU) is a magazine packed with programs, features and reviews for the less games-only orientated C64/C128 user. Sit down and ask yourself these simple questions:

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So 'Come on Down' the price is right! Take a step in the right direction and subscribe to COMMODORE DISK USER.



FOUR GROUND

Mark Everingham is back with the concluding part of his Introduction to Plus/4 Machine Language

7501 Machine Language Instruction Set

The instruction set of the 7501 processor is simply the collection of commands which the processor can understand, just like all the BASIC commands PRINT, LIST etc. What follows is a list of commands, each three characters long and requiring one operand. The action of the command is shown in symbolic form, with a brief explanation and example. All the examples can be entered into the TEDMON monitor using the method explained earlier. The valid addressing modes are shown along with the listing of any of the flags of the status register altered by the command. The meaning of each addressing mode is explained in the section entitled "The 7501 Addressing Modes". The conventions below are used in the symbolic representation of the operations. In order to conserve on space, only short examples have been included. Many such examples can be found in back issues of *Your Commodore* or in the future *FourGround* articles.

"h" – Hex digit of number	"M" – A memory/immediate byte
"A" – The Accumulator	"N" – The Negative Flag
"B" – The BRK Flag	"V" – The Overflow Flag
"C" – The Carry Flag	"X" – The .X Register
"D" – The Decimal Flag	"Y" – the .Y Register
"I" – Interrupt Enable Flag	"Z" – The Zero Flag

"[a] → [b] – Byte/Bit move from [a] to [b]
"[a] ← [b] – Byte/Bit move from [b] to [a]
"[n]" – Bit n (0-7) in a byte

ADC (Add With Carry)
Operation: A+M+C → A,C Flags Altered: N,Z,C,V

Addressing Modes:			
	ADC # $hh	ADC $hh	ADC $hhh,X
	ADC $hhh,Y	ADC ($hh,X)	ADC ($hh),Y

Function: The ADC instruction is used to add two numbers together, using the accumulator. The operand + the setting of the carry flag (1 or 0) is added to the accumulator and the reult is left in the accumulator. Any carry neccesary is shifted into the carry flag. If the result is > 127 then the N flag is set. If the result is zero, Z is set. If the result is > +127 or < -128, the V flag is set. Normally prior to use, you should clear the carry flag. The example below calculates the sum of 16 and 48.

```
Example: .6000 LDA # $10      'Load .A with value 16
               CLC            'Clear Carry flag for addition
               ADC # $30      'Add value 48
               BRK            'Return to TEDMON
```

AND (Perform Logical AND On Accumulator)
Operation: A AND M→A Flags Altered: N,Z

Addressing Modes				
	AND # $hh	AND $hh	AND $hh,X	AND $hhhh
	AND $hhhh,X	AND $hhh,Y	AND ($hh,X)	AND ($hh),Y

Function: Those bits which are both set to 1 in the accumulator and in the operand are left as 1 in the result. All other bits are set to zero. If the result is >127, N is set and if the result is zero, Z is set. The example below sets alternate bits in the byte 255 to zero.

```
Example: .6000 LDA # $FF      'Load .A with value 255
               AND # $AA      'And .A with value 170
(alternate bits)
               BRK            'Return to TEDMON
```

ASL (Arithmetic Shift Left)
Operation: C←[7.....0]←0 Flags Altered: N,Z,C

Addresing Modes: ASL ASL $hh ASL $hh,X ASL $hhhh ASL $hhh,X

Function: All the bits within either the accumulator or a memory location are shifted left. Big 7 is shifted into the carry flag and Bit 0 is replaced with zero. The N and Z flags are set as for the AND instruction. Shifting a byte left has the effect in binary of multiplying it by two. The example below calculates 24*4.

```
Example: .6000 LDA # $18      'Load .A with value 24
               ASL            'Shift .A left (*2)
               ASL            'Shift .A left (*2)
               BRK            'Return to TEDMON
```

BCC (Branch If Carry Flag Clear)
Operation: Branch If C=0 Flags Altered: None

Addressing Modes: BCC $hhhh

Function: The BCC instruction examines the status of the carry flag and if it is set to zero, jumps to the specified address. Note that the address must be within -128 or +127 of the command address. This is automatically checked by TEDMON. The below example adds two numbers and if a carry does not occur, sotres the result on the screen.

```
Example: .6000 : LDA $A5      'Load .A from address £A5
                                  (Clock)
               CLC            'Clear carry flag for addition
               ADC $A6        'Add value in address $A6
                                  (Clock)
               BCC $6098      'If carry clear, jump to $6008
               BRK            'If set, return to TEDMON
               STA $0C00      'Carry clear – store result on
                                  screen
               BRK            'Return to TEDMON
```

BCS (Branch If Carry Flag Set)
Operation: Branch If C=1 Flags Altered: None

Addressing Modes: BCS $hhh

The BCS does the opposite of the BCC instruction. It tests the carry flag and if it is set, jumps to the specified address. Again, this address must be within -128 and +127 of the current address. See the example for BCC, substituting BCS for BCC. This stores the result in the screen memory if a carry **did** occur.

BEQ (Branch If Equal To Zero)
Operation: Branch If Z=1 Flags Altered: None

Addressing Modes: BEQ $hhhh

Function: The BEQ instruction jumps to the specified address if the last result set the Z flag because it was equal to zero. The example below adds the value in $D0 to the value in $D1 and if the result is zero (they are both zero) then it stores an " " symbol on the screen.

```
Example: .6000 LDA $D0        'Load .A with value in $D0
               CLC            'Clear carry flag for addition
               ADC $D1        'Add calue in £D1
               BEQ $6008      'If result is zero, jump to
                                  $6008
               BRK            'Result is not zero – Return to
                                  TEDMON
               STA $0C00      'Store value 0 in screen
memory
               BRK            'Return to TEDMON
```

BIT (Test Bits In Memory)
Operation: [7] of M → N, [6] of M→ V, Flags Altered: N,Z,V A and M→ Z
Addressing Modes: BIT $hh BIT $hhhh

Function: The BIT instruction tests the bits of a memory location against the value in the accumulator. Bit 7 of the memory value is transfered to N and Bit 6 to Z. If the result of ANDing .A with the memory location is zero, the Z flag is set. Neither the values in the accumulator or in the memory location are changed. The example below looks at the first character on the screen and if it is reversed, replaces it with a space.

```
Example: .6000 BIT $0C00      'Test bits of value on screen
               BMI $6006      'If character is reversed, jump
                                  to $6006
               BRK            'Not reversed – return to TEDMON
               LDA # $20      'Load .A with space character
               STA $0C00      'Store space character on
                                  screen
               BRK            'Return to TEDMON
```

BMI (Branch On Minus)
Operation: Branch if N=1 Flags Altered: None

Addressing Modes: BMI $hhhh

Function: The BMI instruction tests the setting of the N (minus) flag and if it is set, jumps to the specified address. The N flag is set by other instructions where the resultant byte is > 127 (bit 7 set). As for all other branches, the destination address must be within -128 or +127 of the current address. The example below counts from 128 to 254 in steps of two in the accumulator.

```
Example: .6000 LDA # $00      'Load .A with value 0
               CLC            'Clear carry for addition
               ADC # $02      'Add 2 to accumulator
               BMI $6002      'If result >127 jump to $6002
                                  (Loop)
               BRK            'Result < 128 – return to TEDMON
```

BNE (Branch If Not Equal To Zero)
Operation: Branch If Z=0 Registers Altered: None

Addressing Modes: BNE $hhhh

Function: The BNE instruction does the opposite of the BEQ command, performing a jump if the last result was

not zero. See the example for BEQ, replacing BEQ with BNE.

BRK (Break Interrupt)
Operation: PC→Stack, SR→Stack, 1→B Flags Altered: None

Function: The BRK instruction, which needs no operand forces a Break interrupt to occur. On the Plus/4, this causes control to be transferred to TEDMON. In fact, the instruction jumps to the address found in $0316 like a JMP ($0316) command. The PC and SR settings before the command may be pulled off the stack using PLA.

BVC (Branch If Overflow Flag Clear)
Operation: Branch If V=0 Flags Altered: None

Addressing Modes: BVC $hhhh

Function: The BVC instruction tests the status of the V flag in the status register and if it is clear (no overflow has occured), does a jump to the specified address. There is no equivalent BVS instruction. The example loops until Bit 6 of the value in $A3 (Clock) is set.

```
Example: .6000 BIT $D0      'Test bits of value in $D0
               BVC $6000    'Overflow (Bit 6) clear - loop
                            'to $6000
               BRK 'Overflow set - Return to TEDMON
```

CLC (Clear Carry Flag)
Operation: 0→C Flags Altered: C

Function: The CLC instruction which requires no operand resets the value in the carry flag of the status register to zero. The is most useful in preparation for an ADC instruction. See any of the examples using ADC for a demonstration.

CLD (Clear Decimal Mode)
Operation: 0→D Flags Altered: D

Function: The CLD instruction resets the D flag to zero, taking the Plus/4 out of decimal mode back into standard binary arithmetic. For an explanation of the decimal mode, see the SED instruction.

CLI (Clear Interrupt Disable Flag)
Operation: 0→I Flags Altered: I

Function: The CLI instruction clears the I flag and thus enables IRQ interrupts. No other flag is affected. For an explanation of interrupts, see the relevant section.

CLV (Clear Overflow Flag)
Operation: 0→V Flags Altered: V

Function: The CLV instruction simply resets the overflow flag of the SR to zero. Although this is not of any use for arithmetic operations, it can be used to produce a JMP effect using a CLV followed by a BVC. The use of this is that such a command can work when it is placed anywhere in memory whereas a JMP instruction will only work in the address for which it was intended. The example below is equivalent to JMP $6010.

```
Example: .6000 CLV          'Clear the Overflow flag
               BVC $6010    'Branch to $6010
```

CMP (Compare Value Against Accumulator)
Operation: No Effect Flags Altered: N,Z,C

Addressing Modes:				
	CMP # $hh	CMP $hh	CMP $hh,X	CMP $hhhh
	CMP $hhhh,X	CMP $hhhh,Y	CMP ($hh,X)	CMP ($hh),Y

Function: The CMP instruction is used to compare a value with the accumulator in order to find which is larger, smaller, or if they are the same. The bits of the status flag are set thus:-

IF .A < Value THEN N=1, Z=0, C=0
IF .A = Value THEN N=0, Z=1, C=1
IF .A > Value THEN N=0, Z=0, C=1

Combinations of these values are also possible, for instance just testing C shows that .A is greater than or equal to the operand value. Once the CMP instruction has been carried out, you can test the settings of the flags and perform a branch accordingly. The example adds three to the accumulator until the result reaches 160.

```
Example: .6000 LDA # $00    'Load .A with value 0
               CLC          'Clear carry flag for addition
               DC # $03     'Add value 3 to accumulator
               CMP # $A0    'Compare .A to value 160
               BCC $6002    'If .A < 160 jump to $6002
               BRK 'value > =160 - return to TEDMON
```

CPX (Compare Value Against .X)
Operation: No Effect Flags Altered: N,Z,C

Addressing Modes: CPX # $hh CPX $hh CPX $hhhh

Function: The CPX instruction performs an identical operation to CMP except that the comparison takes place between the .X register and the specified operand value. The settings of the flags are identical to those for CMP.

CPY (Compare Value Against .Y)
Operation: No Effect Flags Altered: N,Z,C

Addressing Modes: CPY # $hh CPY $hh CPY $hhhh

Function: The CPY instruction performs an identical operation to CMP except that the comparison takes place between the .y register and the specified operand value. The settings of the flags are identical to those for CMP.

DEC (Decrement Memory)
Operation: M-1 → M Flags Altered: N,Z

Addressing Modes: DEC $hh DEC $hh,X DEC $hhhh DEC $hhhh,X

Function: The DEC instruction is used to decrease the value stored in a memory location by 1, as if you had subtracted one from it. The result of the decrement is stored back in the source location. If the value is decremented past zero it becomes 255. The N flag is set if the result is > 127, and the Z flag set if the result after the decrement is zero. The instruction does not set the carry flag like ADC and SBC. The example below decreases the border colour until it becomes black (value 0).

```
Example: .6000 DEC $FF19  'Decrement border colour in
                                                $FF19
               BNE $6000  'If result< >0 jump to $6000
               BRK        'Result = 0 – Return to TEDMON
```

DEX (Decrement .X)
Operation: X-1 → X   Flags Altered: N,Z

Function: The value currently in the .X register is decreased by one and returned to the X register. As for DEC, if the result goes below zero, it becomes 255. The N and Z flags are set in the same way as by the DEC command. The example below uses the DEX instructions to provide short pause in the running of a program.

```
Example: .6000 LDX # 0    'Load .X with initial value 0
               DEX        'Decrement value in .X
               BNE $6002  'If result<>0 jump to $6002
               BRK        'Return = 0 – return to TEDMON
```

DEY (Decrement .Y)
Operation: Y-1 → Y   Flags Altered: N,X

Function: The DEY instruction performs an identical action to DEX except that it operates on the Y. index register. The example program for DEX will work equally well if LDX and DEX are replaced by LDY and DEY. Settings of flags are as for DEX.

(EOR (Perform Exclusive-Or On Accumulator)
Operation: A EOR M → A   Flags Altered: N,Z

Function: Those bits that are set to one in *either* the accumulator or the specified operand are set to one. Those bits which are both zero in accumulator and operand are set to zero. Those bits which are set to one in *both* accumulator and operand are set to zero. The resultant byte is left in the accumulator. If the result is > 127, N is set, and if the result is zero, Z is set. The EOR instruction has the effect of toggling bits in a byte.

INC (INcrement Memory)
Operation: M+1 → M   Flags Altered: N,Z

Addressing Modes:	INC $hh	INC $hh,X	INC $hhhh	INC $hhhh,X

Function: The INC instruction does the opposite of the DEC instruction, adding one to the value stored in a specified memory location. The result after the incrementation is stored back in the source location. If the value is incremented past 255, it returns to zero. The N flag is set if the result is > 127, and the Z flag if the result is zero. The example below increments the border colour until it goes past 255 back to 0 (black).

```
Example: .6000 INC $FF19  'Increment border colour in
$FF19
               BNE $6000  'If result<>0 jump to $6000
               BRK 'Result =0 – return to TEDMON
```

INX (INcrement .X)
Operation: X+1 → X   Flags Altered: N,Z

Function: The INX instruction performs the same operation as INC except that it increments the .X register rather than a memory location. The operation and flag settings other than this are identical to INC. The example below increments the value originally in the .X register until it reaches 192.

```
Example: .6000 INX        'Increment value in .X register
               CPX # $C0  'Comapre value in .X to 192
               BNE $6000  'If .X<>192 jump to $6000
               BRK        '.X = 192 – return to TEDMON
```

JMP (Jump To Location)
Operation: M → PC   Flags Altered: None

Function: The JMP instruction is used to change program flow to a specified address, like the BASIC GOTO command. None of the flag or register settings are changed. The jump is unconditional and is not limited to the -128, +127 range imposed on branch instructions. The example below just jumps back to itself for ever!

```
Example: .6000 JMP $6000 'Jump unconditionally to
                                         to $6000
```

JSR (Jump To Sub-Routine)
Operation: PC +2→Stack, M→PC   Flags Altered: None

Addressing Modes: JSR $hhhh

Function: The JSR instruction is equivalent to the GOSUB command in BASIC. First the address to which control must return after the sub-routine is pushed onto the stack, and then a jump is carried out to the specified absolute address. When a subsequent RTS is found, the return address is pulled back off the stack and jumped to. The example below calls a short routine to increment the border volour, then ends.

```
Example: .6000 JSR $6004  'Jump to sub-routine at $6004
               BRK        'Return to TEDMON
               INC $FF19  'Sub-routine – increment
                                        border colour
               RTS        'Return from sub-routine
```

LDA (Load Accumulator)
Operation: M → A   Flags Altered: N,Z
and 255 *ad infinitum*.

```
Example: .6000 LDA $FF15  'Load .A with background
                                    colour in $FF15
               EOR # $FF  'Toggle every bit in byte
               STA $FF15  'Store back in background
                                              colour
               JMP $6000  'Loop back to start
```

Addressing Modes:

LDA # $hh	LDA $hh	LDA $hh,X
LDA $hhhh	LDA $hhhh,X	LDA $hhhh,Y
LDA ($hh,X)	LDA ($hh),Y	

Function: The LDA instruction is used to transfer a value to the accumulator. The specified operand value is loaded into the accumulator. The N flag is set if the value is >127, and Z is set if the value is zero. The source value is not affected. For examples, see any of the example programs using the instruction.

LDX (Load .X)
Operation: M → X   Flags Altered: N,Z

Addressing Modes:

LDX # $hh	LDX $hh	LDX $hh,Y
LDX $hhhh	LDA $hhhh,Y	

LDX instruction is identical in use to LDA but the specified value is loaded into the .X register.

LDY (Load .Y)
Operation: M → Y   Flags Altered: N,Z

Addressing Modes:

LDY # $hh	LDY $hh	LDY $hh,X
LDY $hhhh	LDA $hhhh,X	

Function: The LDY instruction is identical in use to LDA but the specified value is loaded into the .Y index register.

LSR (Logical Shift Right)
Operation: 0→[7.....0]→C Flags Altered: N,Z,C

Addressing Modes:	LSR	LSR $hh,X	LSR $hhhh	LSR $hhhh,X

Function: The LSR instruction performs the opposite of the ASL instruction. All the bits within the accumulator or memory location are shifted to the right. Bit 0 falls out into the carry flag, and bit 7 is replaced with zero. This has the effect of dividing a number by two with the binary carry bit being left in the carry flag. The example below calculates 192/8.

```
Example: .6000 LDA   $C0     'Load .A with value 192
               LSR           'Shift .A right (/2)
               LSR           'Shift .A right (/2)
               LSR           'Shift .A right (/2)
               BRK           'Return to TEDMON
```

NOP (Null Operation)
Operation: None   Flags Altered: None

Function: The NOP instruction simply does nothing – it does not affect any register or flag, and creates a time delay of 2 clock cycles. The instruction is often used either to give a space between sections of a program or to replace other instructions during debugging.

ORA (Perform Logical OR)
Operation: A OR M → A   Flags Altered: N,Z

Addressing Modes:	ORA # $hh	ORA $hh	ORA $hh,X	ORA ($hh),Y
	ORA $hhhh,X	ORA $hhhh,Y	ORA ($hh,X)	ORA ($hh),Y

Function: All the bits which are set to zero in both accumulator and operand byte are set to zero. All bits which are set to one in either or both of the accumulator and operand are set to one. The result is left in the accumulator. The N and Z flags are set as for the AND instruction. The exampole below sets bit 7 of the character at the start of the screen, so reversing it.

```
Example: .6000 LDA $0C00      'Load accumulator from
                                          screen byte
               ORA # $80  'Set bit 7 (OR with value 128)
               STA $0C00      'Return byte to screen
               BRK            'Return to TEDMON
```

PHA (Push Accumulator Onto Stack)
Operation: A → Stack   Flags Altered: None

Function: The PHA instruction is used to push the value currently in the accumulator onto the machine stack. Once there, it can be pulled back into the accumulator using PLA. For information on the stack, see the relevant section. The example below uses a push and then pull to set up the status register flags.

```
Example: .6000 PHA     'Push value in accumulator onto
stack
               PLA   'Pull value back of stack & set flags
               BRL          'Return to TEDMON
```

PHP (Push Processor Status Reigster Onto Stack)
Operation: SR → Stack   Flags Altered: None

Function: The PHP instruction does the same as the PHA instruction except that it is the status register which is pushed onto the stack rather than the accumulator. This is useful for two purposes: retaining the status register when calling a sub-routine and examining the status register by pushing PHP and pulling PLA.

PLA (Pull Accumulator From Stack)
Operation: Stack → A   Flags Altered: N,Z

Function: The PLA instruction pulls a value off the stack into the accumulator previously pushed on using the PHA instruction. The N and Z flags are set in accordance with the manner for the LDA instruction. For an example, see PHA.

ROL (Rotate Left)
Operation: C←[7.....0]←C   Flags Altered: N,Z,C

Addressing Modes:	ROL	ROL $hh	ROL $hh,X	ROL $hhhh
ROL $hhhh,X				

Function: Bit 7 of the accumulator or memory location is shifted into the carry flag. Bits 6 through 1 are shifted left one bit, and the carry flag before the operation is shifted into bit 0. The result is left either in the accumulator or in the memory location specified. If the result is > 127, N is set and if the result is zero, Z is set. The example below uses ROL and ASL to multiply a 16-bit number by two. The low byte ($hhLL) is stored in $D0 and the high byte ($HH11) in $D1.

```
Example: .6000 ASL $D0    'Shift low byte in $Di left (*2)
               ROL $D1    'Rotate high byte + carry left
                                                   (*2)
               BRK               'Return to TEDMON
```

ROR (Rotate Right)
Operation: C→[7.....0]→C   Flags Altered: N,Z,C

Function: The ROR command does the opposite of ROL. Bit 0 is shifted into the carry flag. Bits 6 through 1 are shifted right one bit, and bit 7 is replaced by the carry flag prior to the operation. This can be used in conjunction with LSR to perform two-byte division by two. The example below divides the 16-bit value in $D0 (low) and $D1 (high) by two.

Example: .6000 LSR $D1 'Shift high byte in $D1 right (/2)
RDR $D0 'Rotate low byte in $D0 right (/2)

RTI (Return From Interrupt)
Operation: Stack→SR, Stack→PC Flags Altered: A11

Addressing Modes: Implied

Function: The RTI instruction is used like RTS but to return control to the main program after an interrupt has been serviced. It is usually not used on the Plus/4 as the Plus/4's own interrupt handler is normally used. For more information, see the section on interrupts.

SEC (Set Carry Flag)
Operation: 1 → C Flags Altered: C

Function: The SEC instruction simply sets the carry flag in the status register to one. This is mostly used as preparation for the SBC instruction which requires the flag to be set before subtraction. See SBC for an example of its use.

SED (Set Decimal Mode)
Operation: 1 → D Flags Altered: D

Function: The SED instruction puts the 7501 processor in your Plus/4 into its decimal emulation or BCD (Binary Coded Decimal) mode. Normally, numbers are represented in binary, 8 bits holding a number up to 255. In decimal mode, each byte hold a number between 0 and 99. The numbers are represented by two hex digits: $99 is 99 decimal, $23 is 23 decimal and $67 is 67 decimal, digits over $9 not being allowed. The mode is of limited use. The only time I have used it myself is for an on-screen clock in my OOPS! program to be printe din "Your Commodore" in the future. All the arithmetic (ADC and SBC) instructions work while in decimal mode. The example below uses decimal mode to add 23 and 54 together, giving a BCD result.

```
Example: .6000 SED          'Enable decimal mode
               LDA # $23    'Load .A with BCD value 23
               CLC          'Clear carry flag for addition
               ADC # $54    'Add BCD value 54 to .A
               BRK          'Return to TEDMON
```

SEI (Set Interrupt Disable Flag)
Operation: 1 → 1 Flags Altered: I

Function: The SEI instrucvtion disables all IRQ interrupts by setting the interrupt disable flag in the status register. For a full discussion, see the section on interrupts.

TAX (Transfer Accumulator to .X)
Operation: A → X Flags Altered: N,Z

Function: The TAX instruction simply moves the value in the accumulator into the .X index register. The command also sets the N and Z registers accordinglyu, as if a LDA instruction had been performed. The example below pulls a value off the stack and transfers it to the .X register. This is useful as there are no PLX, PLY instructions.

```
Example: .6000 PLA   'Pull byte off stack into accumulator
               TAX   'Transfer value into .X
               BRK   'Return to TEDMON
```

TAY (Transfer Accumulator to .Y)
Operation: A → Y Flags Altered: N,Z

Function: The TAY instruction works in exactly the same way as the TAX instruction, transferring the value in ther accumulator into the .X register and setting the N and Z flags as for LDA. See TAX for an equivalent example.

TSX (Transfer Stack Pointer to .X)
Operation: SP → X Flags Altered: N,Z

Function: As mentioned in the section on the stack, the pushing and pulling values on the stack is handled by an index register, the stack pointer (SP). The value in the stack pointer may be transferred into .X using the TSX instruction. This provides an alternative means of accessing the stack, not needing the accumulator. The example below pushes a value onto the stack and then retrieves it in .Y without using the accumulator.

```
Example: .6000 PHA          'Push accumulator onto stack
               TSX          'Transfer SP to .X register
               INX          'Increment .X register
               LDY $0100,X  'Pull .Y from stack area
               TXS          'Restore new SP setting
               BRL          'Return to TEDMON
```

TXA (Transfer.X To Accumulator)
Operation: X → A Flags Altered: N,Z

Function: TXA works just like TAX except here the value stored in .X is transfered to the accumulator instead of vice-versa. This can be especially useful when you want to store the value in .X on the stack temporarily. The example below shows this.

```
Example: .6000 TXA   'Transfer value in .X to accumulator
               PHA   'Push value onto stack
               BRK   'Return to TEDMON
```

TSX (Transfer .X To Stack Pointer)
Operation: X → SP Flags Altered: N,Z

Function: As the reverse of TSX, the value in the .X index register is transferred to the stack pointer. This insruction should be used with care as incorrect setting of the stack pointer can cause a program to crash. For an example of correct use, see TSX.

TYA (Transfer .Y To Accumulator)
Operation: Y → A Flags Altered: N,Z

Function: The TYA works just like TAX and TAY except that the value in the .Y register is transferred to the accumulator. For an applicable example, see TAX and TAY.

7501 Addressing Modes

Most of the 7501 instructions just covered require a number as their operand. However, this number can take many forms, all of which lead to a simple byte-long number. The way in which this final number is specified is called an addressing mode. In all operations except stores and jumps,

the actual number is the contents of the address specified and not the address itself.

Implied Mode. With implied mode, no operand is specified. In a command like TXA or PHA, the location of the data byte is implied by the command. Also, commands like ASL or ROL can be used implied because omitting the operand chooses the accumulator as the data location.

Immediate Mode [# $hh]. In immediate mode, you specify the byte number directly rather than as an address.

Absolute Mode [$hhhh]. In absolute mode, you simply specify an address of a memory location in the range 0-65535. The byte operand is then defined as the contents of the location you have specified.

Zero Page Mode [$hh]. Zero page mode is identical to absolute mode except that the address you specify can only be between 0 and 255. The advantage of using this mode is that it is faster, and because the operand is 8-bit instead of 16-bit, the command takes up one byte less than when using absolute mode.

Relative Mode. Relative mode is that used for all branch instructions. The idea is that instead of specifying an absolute address, you provide an offset which is added to the current address to find the destination. The programmer never has to worry about how this offset is calculated as TEDMON does the calculation for you.

Indirect Mode [($hhh)]. Indirect mode can only be used by one command, the JMP instruction. The 7501 looks at the absolute address you specify, and gets its jump address from there. The final address is stored with low byte ($hhLL) at the location specified, and the high byte ($HH4) at the next location on.

Absolute Indexed Mode [$hhhh,X/$hhhh,Y]. Absolute indexed mode calculates the address from which to get a byte by adding the value stored in the index register you specify to the base address. Thus if .X is set to 34, LDA $1200,X would get a byte from the address $1234.

Zero Page Indexed Mode [$hh,X/$hh,Y]. Zero Page indexed addressing is the same as absolute indexed except that the base address can be between 0 and 255 instead of 0 and 65535. The advantage is speed and compactness.

Indirect Indexed Mode [($hh),Y]. Indirect indexed mode, sometimes called post-index indirect mode is a little more complex. The address $hh is a zero page address (0-255). The base address is found in $hh (low byte) and $hh+1 (high byte). From then on, the mode works like absolute indexed mode. $hhhh,Y with $hhhh being the address found at $hh in zero page. The .Y register is added to the address to give the final address.

Indexed Indirect Mode [($hh,X)]. Indexed indirect mode, sometimes called pre-indexed indirect mode is a little strange. The address location is calculated thus: The zero page address $hh is added to the value in .X. A base address is then loaded from the zero page address $hh+X, and this forms the final 16-bit address. The mode seems of limited value, and I have never myself seen a program on any 7501-type processor using the mode!

Plus/4 ROM/RAM Paging Considerations For Data Transfer

Most computers, such as the BBC Micro have only one memory map. That is to say that RAM extends from $0000-$7FFFF and ROM from $8000-$FFFF. The Plus/4 however is more flexible than that. It has RAM from $0000-$7FFF, but the area from $8000 onwards can either be RAM or ROM, giving the computer a full 64K of RAM. You can choose to have ROM at $8000- by doing a STA $FF3E, and ROM by doing a STA $FF3F. All LDA, JSR etc. operations work on the current type of memory, ROM or RAM. Note that when using RAM at $8000 onwards, you must disable interrupts first. The two programs below would appear at first to do the same thing, but the first loads the accumulator with a byte from ROM and the second from RAM, by using the STA instructions to page RAM or ROM in.

```
Program 1:   SEI
             STA $FF3E
             LDA $8000
             STA $FF3E
             CLI
             BRK

Program 2:   SEI
             STA $FF3F
             LDA $8000
             STA $FF3E
             CLI
             BRK
```

The simple method of choosing between ROM and RAM configurations makes the Plus/4 far more powerful than standard single memory map computers.

An Introduction To Plus/4 7501 Interrupts

Interrupts seem to frighten many people, but are really nothing to fear. Interrupts are just what they sound like – interrupts! You can program your Plus/4 so that whenever a specific event occurs, it interrupts the main program which is running, and says "Hang on a minute, I'm sorry to interrupt but I've got something important to do now so you'll have to wait until I've finished." Your program, called the interrupt handler can then do whatever it wants, then it returns control back to the main program which continues running as if nothing had happened.

There are several different events which can be used to generate interrupts, but here we will consider only the simplest, what are called raster interrupts. Normally, interrupts are used on the Plus/4 to keep the system clock read by TI and TI$ running. Every time the screen on your TV or monitor is redrawn, an interrupt is generated. This occurs every 50th of a second in the UK. When this interrupt is generated, a JMP instruction is done: JMP ($0314), $0314 being a "vector" containing the address at which an interrupt handler can be found. Then, a routine in the ROM of your Plus/4 updates the clock, scans the keyboard and does miscellaneous other work. This means that you can get your own program to run at the same time as Basic, by changing the address stored in $0314. The program below sets up interrupts so that every 50th of a second, the border colour is incremented.

```
.6000 SEI          'Disable interrupts for setup
      LDA # $0D    'Load .A with low byte of $600D
      STA $0314    'Store low byte in interrupt vector
      LDA # $60    'Load .A with high byte of $600D
      STA $0315    'Store high byte in interrupt vector
      CLI          'Re-enable interrupts
      RTS          'Return to BASIC
      PHP          'Interrupt Handler – Push SR to stack
      INC $FF19    'Increment border colour
      PLP          ' Pull SR back of stack
      JMP $CE0E    'Return to ROM interrupt handler
```

The program can be entered into TEDMON and then

called by eXiting to Basic and doing a SYS DEC ("6000") to enable the routine (equivalent to G$6000). From then on, everything works normally, but the border colour changes colour rapidly. This is how the program works.

The first section just changes the address at $0314-$0315 to point to our program at $600D. When you change this address, you should always stop interrupts first, and re-enable them when you're done. The interrupt handler routine now in action first saves the SR on the stack. Any routine used as an interrupt handler must preserve the contents of all the registers so they should be pushed into the stack and then restored at the end of the routine, hence the PLP. Control is then returned to the ROM by a JMP $CE0E into the ROM interrupt handler. This allows the ROM's routine to work, to keep the keyboard active and to update the clock.

And that's really all there is to it! Obviously, there are many ways in which interrupts can be used other than this simple demonstration, and the scope of the subject is really beyond this magazine, but once you grasp the basic principle, you should have no problem going onto more complex uses.

Bibliography And Final Word...

I hope from this short series I have given you an appetising taste of machine code and a foundation knowledge. We have only covered the simpler aspects of machine language programming due to lack of space, and you will probably find this course most useful accompanied by a few reference books. The books I used to write the introduction to machine-code, and which I would recommend are:

"Programmer's Reference Guide For The Plus/4" ISBN 0-673-182409-5 (Scott Foresman & Company)

"C16/Plus 4 Reference Book" (Anco) ISBN 2-717-00101-5

"The Complete Commodore 16 ROM Disassembly" ISBN 0-7156-2004-6 (Duckworth)

FOUR GROUND

COMPETITION

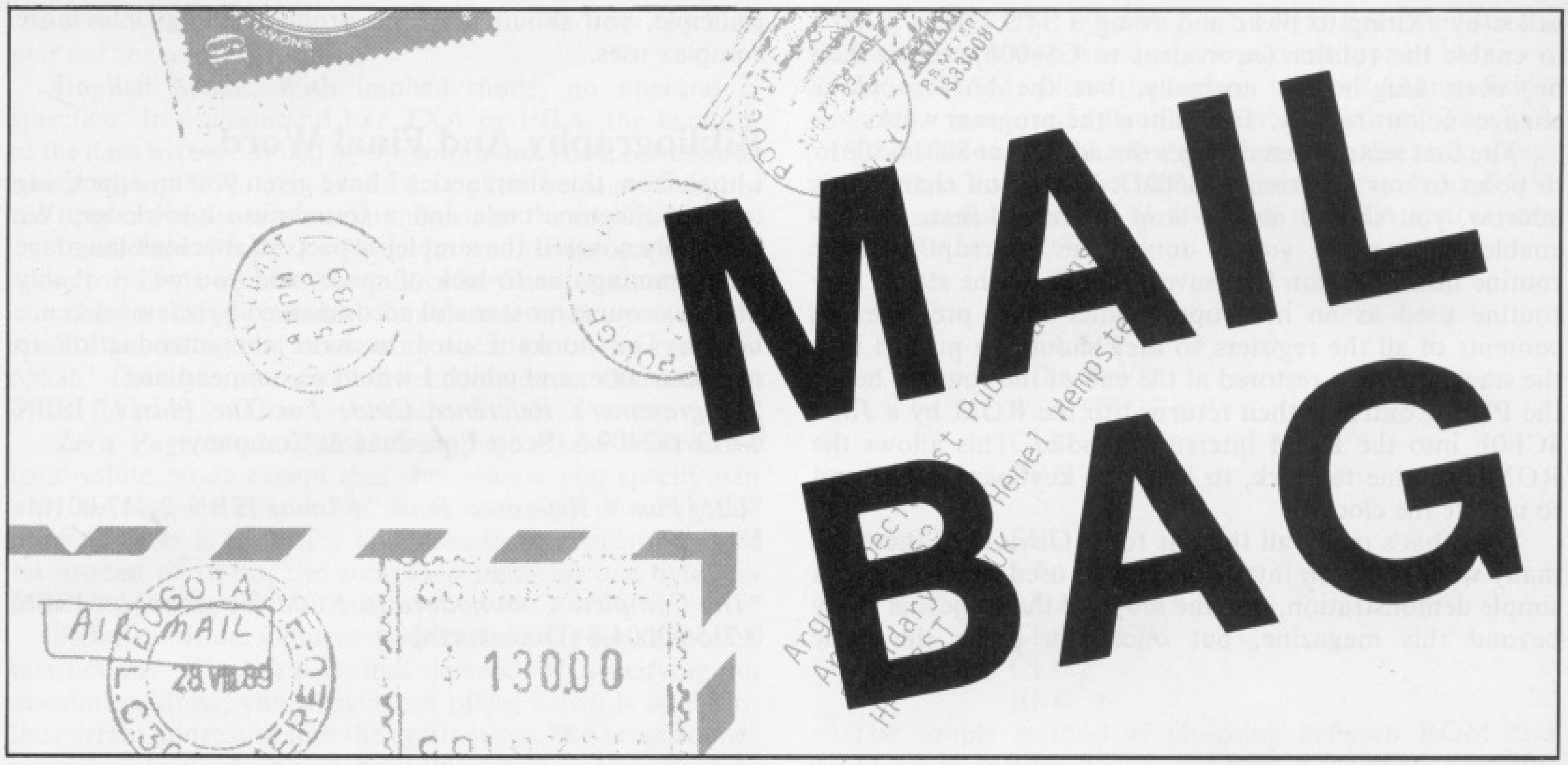
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Put pen to paper and tell us your news, views and groans

Dear YC
I feel that I must write and express my views.

I purchased a *C16* in 1984 and enjoyed the scope of this machine so much that the following year I bought a *Plis/4*, and am still impressed by its capabilities.

However, things might have been different if I had known at the time that both of these machines were only a stop-gap until the *C128* and *Amiga* werer developed more.

Although I am satisfied with the *Plus/4*, the software manufacturers appear not to be, support for the machine has been poor. It is picking up slowly now but the demand will never be as great as for the *C64*, because it lacks the numbers game.

So, why not help all those C16 and Plus/4 owners and compile a C16-Plus/4 edition of *Your Commodore*, you already have the material to hand, so why not re-cycle and up-date a selection of articles from the last five years' magazines. Your range of material must be vast, therefore this edition would appeal to all levels of operators.

Perhaps if you did run such an edition, you might influence some software manufacturers to think again – not such a bad idea!!

K. Williams, Gt. Yarmouth, Nofrolk

I agree wholeheartedly with you. The Plus/4 is a very much underrated machine.

However, you cannot simply just produce a one off magazine like this every so often. In fact, we have already published the 'Your Commodore C16 and Plus/4 essential guide', *back in 1988. On top of this, we have to date got no less than 5 disks of Plus/4 software available through our* Readers Services *department. The fact of the matter is this, like any other commodity, computers and computer software rely on supply and demand. I think that the following will clearly show what I mean.*

At the moment, I have 154 readers submissions awaiting publication. This figure can be broken down as follows:
C64 = 141: C128 = 4: Amiga = 1: Plus/4 = 8. (C'est la vie).

Dear YC
Could you, through your letters pages, please help me solve one of life's great mysteries.

I have been searching this fair land of ours for some 18 months now, for a copy of the instruction manual for the *Currah Speech Cartridge.* Unfortunately, my efforts have proved fruitless. I am turning to you as a last resort. Could you please publish my plea for any help in this matter. Thank you.

Ken Cole, 33 Ramsfort House, Roseberry Street, London SE16 3NZ

Thanks for the letter. Here goes...

Come on now you lot out there, someone must be able to help our Ken. Any help would be must appreciated. Please send all replies direct to Ken and not to Your Commodore. *Thank you.*

Dear YC
The reason for this letter is simple. I am a dedicated *C16-Plus/4* user. Therefore, I have started a *C16-Plus/4* club. The club intends to produce a monthly magazine which will include Program listings, Tips, Hints, Pokes and Reviews.

If there are any *C16-Plus/4* owners that would like to join the club, they can write to me at the address below for details. I would like to add that any *C16-Plus/4* users can join, no mater what age, sex, level of competance you are.

R. Robinson, 112 Cliff Road, Hornsea, North Humberside, HU18 1JE.

Thanks for your letter. It is nice to see that someone is actually doing something positive for a change. Good luck with the venture.

Dear YC
I was interested to read your review article about the LC-10C colour printer. I purchased one about a month ago. On arrival, a small part of the membrane key system was dented, which was of course no matter to the control or print output. But after 3-4 colour printouts, two hex dumps in colour, then 8-9 test ones (in Black), in NLQ, the NLQ faded to below draft quality! I therefore phoned *Star* and spoke to someone that sounded like a young girl assistant. I do not think she understood what I explained to her. I later spoke to someone that appeared to be more technicallay minded. We both agreed that the ribbon should last for more than trhose few printouts at NLQ. this was at 11:30 in the morning. At 11:45 the next morning a replacement colour ribbon arrived by post. How's that for excellent after sales service?? (11 out of 10 to Star).

I wrote back with my thanks, and the following suggestions:

1. The clear part of the plastic cover should be removable in addition to the rest of the plastic cover. This lets one see the print as it is made.

2. As far as I know, only fanfold paper can be scrolled back by the printer, to the top of the page. Single sheets do not obey the command. It should be made possible for single sheets.

3. I found out that if one pulls the release lever to one then 'backs' the single sheet with the first sheet of fanfold paper, then the command for the printer to return both the single sheet together with the first sheet of the fanfold paper does work. The fanfold sheet is the first of several sheets of the fanfold stack. The purpose of all this??? One can print in more detailed graphics to pin detail.

J. Bradley, Lanarkshire, Scotland.

Thank you for your comments regarding the review. I have tried your suggestion regarding the scrolling and it does appear to work just fine. Thanks for the tips.

All your C128 problems answered by resident boffin Stuart Cooke.

128 CORNER

Cry for help

Dear 128 Corner,
I wonder if you or any of your readers can help me. When using my 128 in CP/M mode I am unable to display the Pound sterling sign on either the Screen or the printer.

On pressing the POUND key I get a Hash sign (#) displayed instead. Just as if I had pressed the Hash key.

If you can solve this problem it would make life easier for me as at the moment when in CP/M I have to type Pounds sterling.

I use a Wordprocessor called VDE13 which I obtained from the Public domain, (I am writing this with it) which I think is very good, but would be even better if I could use the POUND sign.

I would also like to know if it is possible to change the Character colour from purple on booting CP/M. Can I change the colour from within a profile.sub file, as I have put this file on my CP/M boot disk so as to ask me the Date and time on booting CP/M.

Your Commodore is a brilliant Mag for Commodore users and the 128 Corner is a great idea, its encouraged me to write to you, and I hope you are able to keep it going.
Steve Travis,
Barnsley

After much experimenting in the office I'm afraid that we've come up with a blank regarding your pound sign. You can alter the keymap using the KEYDEF program that is on your system disk to alter the code that any key on the keyboard prints. All we can suggest is that you change the character code that is assigned to the pond key to the same code that your printer expects for this character. You may find that the character does not appear as a pound on the screen, chances are it will be a back slash, but as long as your printer is set up to print a pound you should have no problems. See your printer manual for details on the code to use for a pound sign.

The same program KEYDEF can be used to set the screen colours upon boot up. Don't make changes to the system disk supplied with your C128, make them on a copy of it. KEYDEF has quite a large help file associated with it so you should have no problems using it.

If anyone knows of a better way to allow Mr Travis to have a pound sign please let us know.

Glad to hear that you like the mag and C128 Corner. Remember keep writing in with any tips, hits, views on software and general queries and we'll do our best to keep this page both topical and informative.

Video Memory Expansion

Dear 128 Corner,
In the July issue of *Your Commodore* you mentioned the video memory expansion from ESSL that brings the video memory of the VDC up to 64 K and you said that you don't know an order company that sells such an expansion.

There is a company in Switzerland that sells such an expansion and also a special Basic that supports the new memory. With this Basic you will be able to reach a resolution of 700x720 pixels.

The program is called *Graphic Booster* and it is available with the memory expansion for the C128/D in the plastic case and without the expansion for the C 128 D in the metal case. Contact Combo AG, Tugginerweg 3, CH-4500 Solothurn, Switzerland.
J. Beta
Ingerkingen
W. Germany

It's good to see that Your Commodore reaches parts that other computer mags cannot reach!

Thanks for the info on the Swedish company, other readers may wish to contact them directly at the address quoted. I have writte to the company myself and will let you know through these pages about prices and any other C128 goodies that they may have available as soon as I get a reply.

18 into 8 won't go

Dear 128 Corner,
I have just read your article *C128 Corner* in the recent edition of *Your Commodore*, and must congratulate you upon taking the initiative to set up a regular page for C128 users.

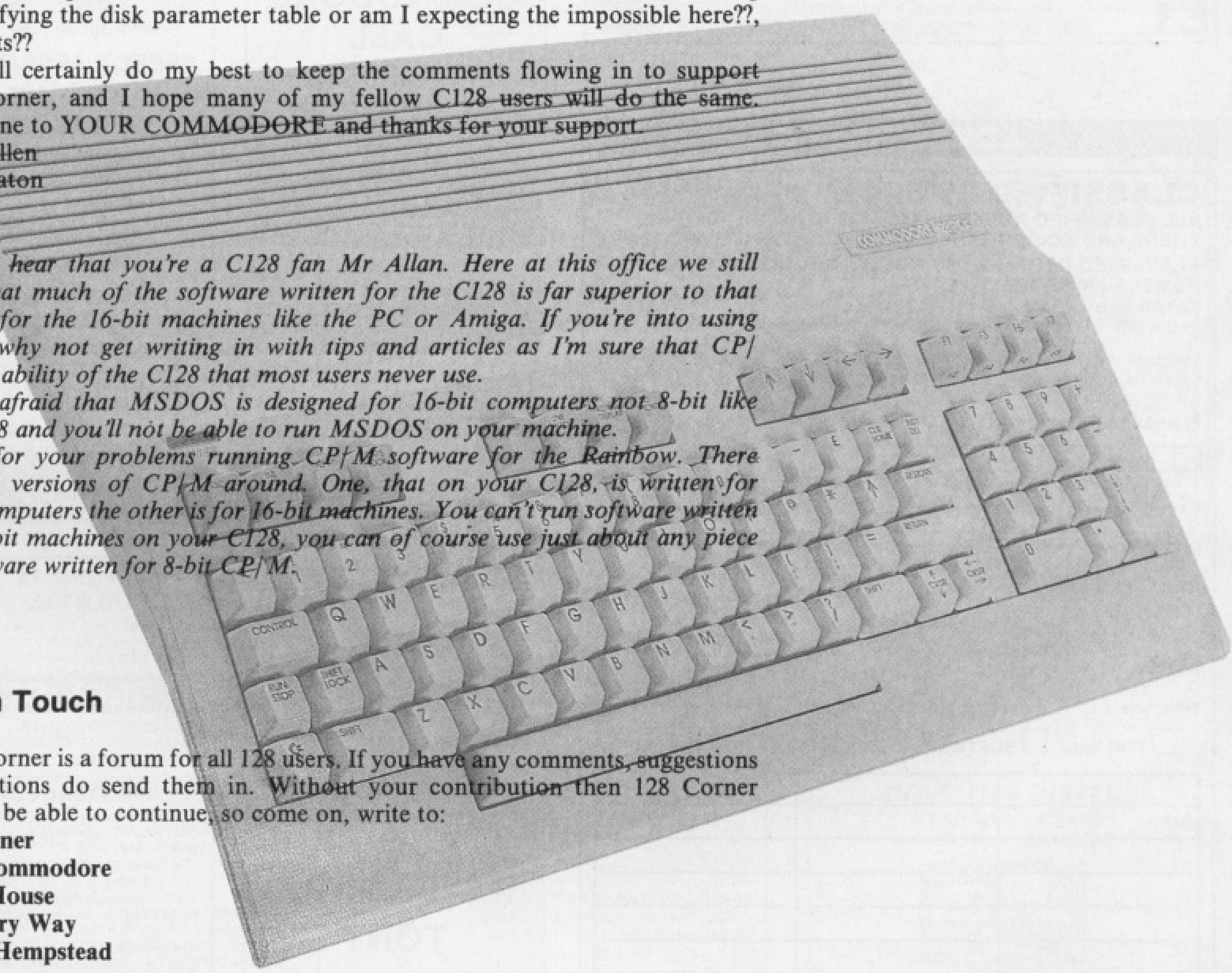
I have been a Commodore fan for a number of years, and earlier this year decided to upgrade from the old faithful C64 which had served its purpose well but was stretched to its limits. Although the Amiga and PC clones looked very attractive, the initial outlay for both hardware and software was prohibitive!! so the C128D was bought, and C64 sold, the prospect of wider horizons for myself, and lots of old C64 software to keep the kids happy. Then the bubble burst.....where was all the software and support for this machine.....oh dear I've bought a dud!!! etc etc.

However I can now say how pleased I am with the C128D, with real wordprocessing courtesy of *Superscript*, and a machine which can offer the budding programmer 2 processors to play with. I have progressed now to the stage of writing small Z80 routines in 128 mode and transfering them over into CP/M, and feel that the opportunities for learning are once agaain wide open. OK my pals with the PC clones can still boast massive memories, terrific speeds, and huge cost for software!!, but many admit when having seen the C128 in action that its presentation and results are virtually as good, but the C128 is far more versatile and offers the learner far more scope.

Is it beyond the bounds of possibility for an MS DOS emulator to be constructed with the Z80, or is it exclusive to the 16 bit machines??. I have looked at a few MS DOS books for hints on how the system is put together but all that I can find is user instructions... no nitty gritty!!. Does anyone have any thoughts on this???

I have tried CP/M software from Digital which has been written for a Rainbow computer but the 1571 is unable to read the discs, should I be looking at modifying the disk parameter table or am I expecting the impossible here??, any hints??

I will certainly do my best to keep the comments flowing in to support C128 corner, and I hope many of my fellow C128 users will do the same. Well done to YOUR COMMODORE and thanks for your support.
Chris Allen
Long Eaton



Glad to hear that you're a C128 fan Mr Allan. Here at this office we still think that much of the software written for the C128 is far superior to that written for the 16-bit machines like the PC or Amiga. If you're into using CP/M why not get writing in with tips and articles as I'm sure that CP/M is an ability of the C128 that most users never use.

I'm afraid that MSDOS is designed for 16-bit computers not 8-bit like the C128 and you'll not be able to run MSDOS on your machine.

As for your problems running CP/M software for the Rainbow. There are two versions of CP/M around. One, that on your C128, is written for 8-bit computers the other is for 16-bit machines. You can't run software written for 16-bit machines on your C128, you can of course use just about any piece of software written for 8-bit CP/M.

Get In Touch

C128 Corner is a forum for all 128 users. If you have any comments, suggestions or questions do send them in. Without your contribution then 128 Corner will not be able to continue, so come on, write to:

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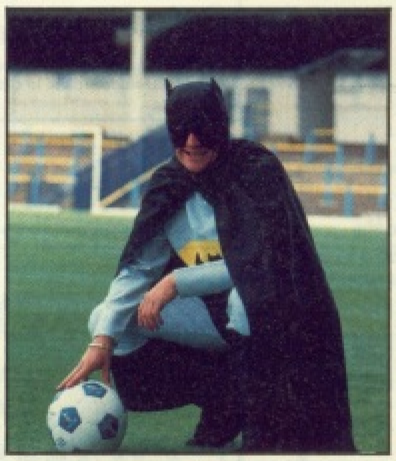
Bribe of the Month



The big wobbly jelly spider – Virgin Mastertronic

Gazza signs for wrong game

Paul Gasgoigne was obviously confused at the recent press launch in aid of his new game. He performed a photo shoot in what one might call a 'naff' Batman costume for the shoot photographers that arrived. This was either a very clever ploy by Ocean software's Gary Bracey, or he was modelling next year's Tottenham strip, I know which excuse I'd plump for.





Freddy finally killed off

Ha! Ha! US Gold does what no American teenager could, it has eliminated the master of dreams himself, Freddy Krueger. Although we had planned a large feature on Mr. Pizzaface, we have been informed that the computer game has been scrapped and there are no plans to resurrect it in the future. Mr. Eves you can take the mask off now. What do you mean "what mask?"



Christmas is coming

As a special competition for Public Relations peeps, YC has opened a Christmas bribe league. In our January issue (which promises to be big and wobbly) there will be a league table with a list of the top ten freebies received by the press date, and the companies who donated them.

Ad Manager in brain swap shock

Paul Kavanagh, Ad Manager on your big wobbly YC, recently undertook a perilous operation which scientists have been trying to perform for years. He volunteered to have his brain swapped with that of a new born chimp; when asked is it was a success he replied "Ooooh! Ooooh! Oooooh!". Fellow staff members have noticed a dramatic improvement.

Reader participation

If anybody discovers a small Commodore/computer related news item, or piccy that they think would fit a page of this caliber, send it in and we'll raise a prize for every one printed. Be careful though, we don't want anything that may raise us UP to gutter level.

The Computer Industry Karma Sutra

No. 1

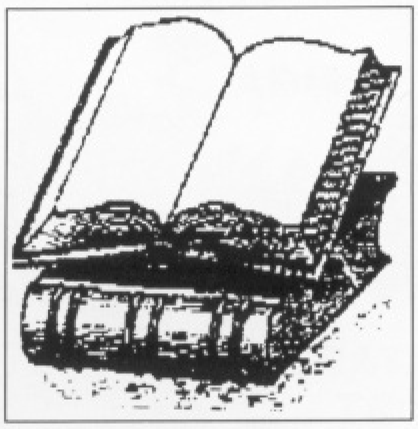


A ball in the hand is worth two in the bush

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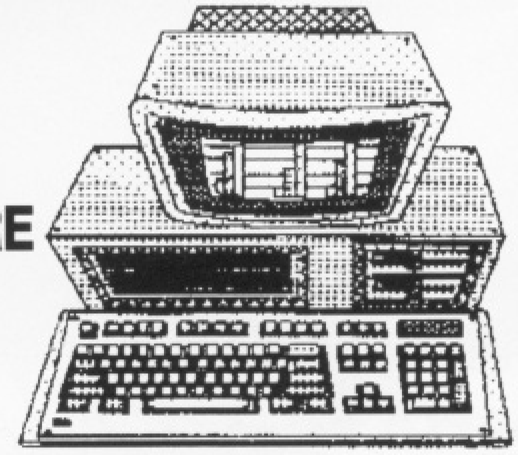


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